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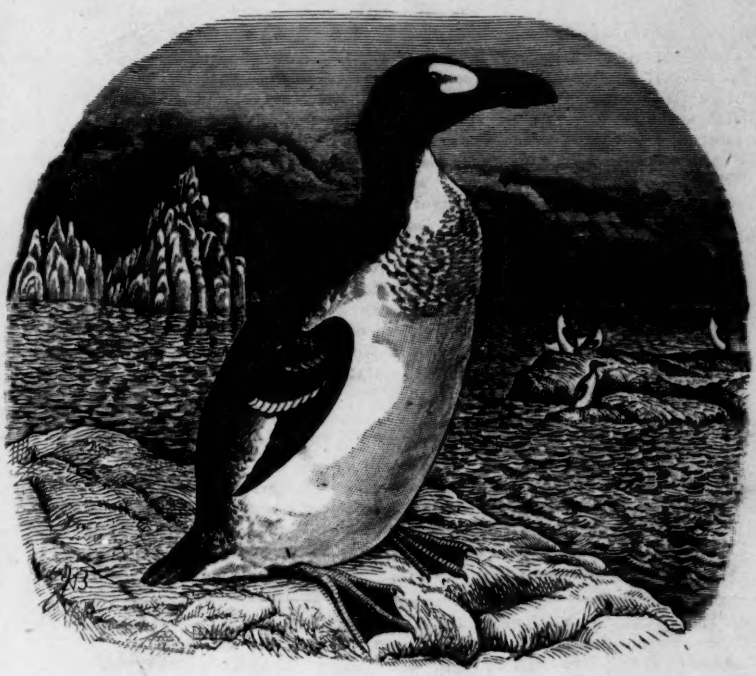

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THE AUK:

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BARRED OWLS IN CAPTIVITY.

BY FRANK BOLLES.

CHOCORUA is one of the boldest, most picturesque, and at the same time one of the most southerly, of the White Mountains of New Hampshire. At its southern foot are several small lakes fed by its streams. The chief of these streams is called Chocorua River, and its main lake Chocorua Lake. North of this water, fringing the river for half a mile, is a growth of yellow birch, beech, and hemlock of considerable age and size. The dainty Parula is frequently seen in its gray moss. Cooper's Hawks, Broad-winged Hawks, and Yellow-bellied Woodpeckers are common tenants of its shades. On June 1, 1888, while nest-hunting in its midst, I saw a Barred Owl sitting on the edge of a cavity in a beech. The tree was a giant. The cavity was about thirty-five feet from the ground, on the southwesterly side, and quite large. The Owl did not move, even after I threw a stick at her. Convinced that the cavity was worth exploring, I went home and returned with a friend, a ladder, and a gun. As a result two old birds were shot, and two young ones taken from the nest. The gun was quite necessary, for my friend would have fared badly in climbing if I had not shot the old birds before they could attack him. Their threatening cries and loud snapping of their beaks were quite enough to discourage an unarmed robber.

I wrapped the two young birds in a towel and later placed them side by side in an ordinary canary cage. They were savage, using beaks and claws vigorously. When released in my door-

yard they half hopped, half flew towards the nearest tree, making such rapid progress that I did not risk their loss by a second experiment. For their permanent prison I chose a case in which a piano had been boxed. By standing it upon its end, and nailing perches at different heights, ample space was given the captives. The front of the box was barred horizontally by laths.

On what could the Owls be fed? That was my first problem. Not sharing in the belief of my family that everything in feathers eats dough, I tried raw beef. The birds found it too tough to manage readily, and raw liver was substituted. Nothing could have suited them better, and for the best part of eighteen months liver and beef kidney have been the chief of their diet. For the birds' names the feminine half of my household agreed upon 'Puffy' and 'Fluffy.' At first the names were not of much use, for no one could tell one bird from the other, but it was not long before an event occurred which not only caused them to be readily distinguished, but led to a lifelong differentiation of their characters and careers. Puffy, or he who was thenceforth to be Puffy, caught his left wing between two of the laths, and by his struggles injured it so that it lost most of its usefulness as a wing and became rather an obstruction to his free locomotion. This happened about the middle of June, after my return to Cambridge, and I did not see the Owls again until the second week in July when my long vacation at Chocorua began. I found the birds fifty per cent larger than when I first handled them, and with tempers similarly developed. No one's fingers were safe inside the bars when the young gluttons were hungry. When satiated they were stolid, and did little beyond moving their heads and snapping their beaks. One interesting fact had been developed during my absence: the Owls not only drank water freely, but took prolonged baths whenever fresh water was given them. Their tank was a foot and a half long, a foot wide, and ten inches deep. Their reflections in this comparatively deep and dark pool greatly amused them for a time. On the arrival of fresh water Fluffy was usually the first at the brink, ready to drink several times, and then to step cautiously in. He would test the depth before ducking his head, and then, holding out his wings, he would pump the water under them, flapping his tail and otherwise drenching himself. When thus soaked he became about the size

of a plucked pigeon, the color of a Crow, and a dismal object to look upon. His eyes at such times would stand out from his drenched and drizzling feathers in a most unpleasant way. This habit of bathing has been maintained in all weathers and temperatures. I have seen both birds take their plunges on mornings when the mercury outdoors was not more than 10° F. On such occasions they shiver for hours before drying. After washing, it is their habit to preen each feather in their wings and tails with great care and precision.

During the summer and autumn of 1888, and at intervals since, I have tried various experiments in feeding the Owls. They reject all vegetable substances with the possible exception of cooked oatmeal, although they will sometimes play with apples, grape leaves, fresh twigs, corn silk and husks, tearing them up solely for amusement apparently, and flinging fragments in all directions. Mice they consider a rare treat, and they swallow them without hesitation, head foremost. With birds they are equally pleased, but if one is larger than a Redstart they are quite sure to crush the skull, sometimes eating the head separately, then to pull out the stiff feathers, and after feeling of the wing joints, to swallow head foremost. A Hermit Thrush thus prepared is about the limit of their single swallowing power. They sometimes, especially with larger birds, devour the contents of the abdominal cavity before swallowing the trunk. When an appetizing mouthful has been started on its downward journey the expression of gluttonous enjoyment thrown into their half-closed eyes and distended mouths is something beyond words. One seems to see them taste the morsel all the way down! If a mouthful sticks at first, they jerk their bodies up and down with considerable force, literally ramming it in by concussion. Sometimes the tail of a Warbler thus being lost to sight, remains in one corner of the Owl's mouth. The Owl's practice then is to turn his head towards it far enough to twist the unwilling feathers into the middle of his tongue, and then to swallow violently, always with effect.

With great interest in the result I placed nine live perch and bream in the Owls' tank one morning when they were about three months old. They had never seen fish before. As the light played upon the red fins and bright scales, the birds' excitement was amusing to see. In a very short time, however, they plunged

feet foremost into the water and with almost unerring aim lanced the victims with their talons and flew out with them. Then the head was crushed at its junction with the back bone, the spines were bitten into jelly, and the fish was swallowed. I have seen half a dozen small hornpout caught, disarmed, and swallowed by them in a comparatively short time. Generally all the fish in the tank were caught and killed before any were eaten. Live frogs called for more agility than live fish. When placed on the bottom of the cage or in the water tank, the frogs seemed to realize their danger, and as a rule remained motionless. The Owls would hang their great heads towards them, and eye them intently. The faintest sign of life would lead to a pounce or a desperate chase round the cage. When caught, the frog was subjected to a careful overhauling. Every joint was felt and crushed. As they slid the slippery legs through their beaks they seemed to be searching for spurs or horns which might prevent easy swallowing. Once found spurless, the frog soon vanished. The wood frog seems to be their favorite species, and the leopard frog the least well flavored. Once Puffy caught a toad in the grass, but the creature apparently tasted so unpleasant that it was quickly dropped, while for several minutes the Owl hopped about shaking his head and making motions with his mouth expressive of disgust or even pain. A small salamander was eaten without hesitation.

Once, when unusually hungry, the Owls devoured more than a pint of large, fat earthworms, taking them from my fingers, or picking them up singly with their claws with wonderful dexterity. A plump slug was taken readily by Puffy, but almost instantly flung from his mouth with disgust. Fresh water mussels, abundant in Chocorua Lake, were taken with some hesitation and, I fancied, made Puffy miserable.

Flies, harvest flies, dragon flies, grasshoppers, and beetles of various kinds all proved enjoyable tidbits. But of snakes and turtles the Owls stood in terror during the summer of 1888. The appearance of either led the birds to make desperate efforts to escape between the upper slats of their cage. What was my surprise then, in the summer of 1889, to find that so far as snakes were concerned, timidity was changed to curiosity, and curiosity quickly transformed into an eager desire to catch, kill, and swallow. Even a dead milk snake, three feet long and fat, was eaten

piecemeal until only the well-picked skeleton remained. This was done in August, 1889. Small green snakes were seized by their middle and swallowed doubled, while still writhing.

Generally fresh meat is greatly preferred to that which is stale. I have seen both Owls retire in disgust to the top of their cage when some thoroughly offensive liver was offered them. On the other hand they devoured the skinned carcass of a Broad-winged Hawk when it was in almost as advanced a stage of decay, and once recently, when I placed a piece of luminous kidney in their closet at night, Puffy instantly pounced upon it. I have no doubt from other experiments that the light of the decaying meat, and not its smell, was what attracted him.

On one occasion I found a large number of mice in a barrel of excelsior. Carefully taking out most of the packing, I placed Puffy in the bottom of the barrel. The mice spun round him in confusing circles, but with great coolness he caught one after another until nineteen were disposed of. The Owls between them ate the entire number within six hours. Puffy is also expert in catching and killing chipmunks, when placed with them in a barrel. After seeing one or two let out of a box trap for his benefit, the sight of the trap was enough to bring him to the door of the cage ready to act as executioner. The junction of the head and body of a vertebrate is the point always chosen for the first effective use of the beak. The struggles of a dying victim seem to cause a certain cat-like excitement and pleasure.

During the warm months the Owls require food daily, and in considerable quantities. As cold weather comes on, their demands grow more moderate, and in midwinter they eat little and seem drowsy most of the time. Once or twice I have failed to feed them for nearly a week after giving them a hearty ration. In summer, when fed frequently, and on mixed animal food, they often eject from their throats round pellets made up of the bones, hair, feathers, or other undigested portions of their preceding meal. Once or twice these ejections have been extremely offensive in odor. When hungry the owls betray the fact by whining cries. When fed, if both secure a hold on the first piece of liver, a spirited tug of war ensues, wings, beak, free foot, and tail all being used to gain ground. During such a scrimmage a queer chattering with an undertone of angry whining is kept up, but I never have seen either bird attempt to wound or really injure the

other. Food not required by one of the Owls for immediate use is always hidden in a corner, and often guarded with care against appropriation by the other.

Contrary to my expectations the Owls are not appreciably more active in twilight hours than at other times, and I think they are quiet, possibly asleep, at night. I am certain that in an ordinary degree of darkness they cannot see. If the light goes out while Fluffy is flying in my cellar in the evening, he is sure to crash into something or fall heavily to the ground. I have held Puffy close to a cat in the dark, and he was wholly unaware of her presence. Neither of them has ever shown a dislike for sunlight, and, as will be seen hereafter, they can see without difficulty in the face of the brightest natural light. While watching anything which interests them they have a most characteristic habit of throwing their heads far forward and then swinging them about like signal lanterns, or waving them back and forth and up and down, as if seeking the clearest avenue of vision to the object of interest. This trick is probably due to their ancestors' peering through thick branches in search of prey.

About the third week in September, 1888, the Owls were sent by freight from Chocorua to Cambridge. The journey failed to disturb them, and they took kindly to city life in a sunny corner of my cellar. Their near neighbors were my hens, who resented deeply my early experiments in letting the Owls out in their narrow dominion. The hens fought them bravely when brought to close quarters. My first test with the Owls at liberty proved that they neither feared me nor desired to attack me. They recognized me as their caterer, and hailed my approach with noisy demands for food. I began handling them with heavy gloves which their beaks and talons made little impression upon. Gradually I came to use my bare hands, and with Puffy especially I was soon on familiar terms. The way in which I accustomed him to handling was by first rubbing the top of his head with one finger, and then softly rubbing the back of his head and neck with my finger tips. During the process he seemed almost mesmerized, although occasionally he would recover himself and make a swift snap at my retreating fingers. In the course of a few weeks I gained sufficient influence over both birds to carry them about with great freedom, always beginning by pushing their heads down, and then clasping them round their bodies just be-

low the wings. If turned on their backs while thus held, they remain entirely quiet.

During the greater part of the long winter I keep them in a closet in my main cellar. I found to my cost that I could not keep them in the sunny cellar where my hens were, for the reason that they caught and ate some of my pullets and terrified the survivors so that their lives were a burden. Their only delicacies in these months are mice. Their attitudes in chasing a dead mouse dragged over the cellar by a string are striking. Fluffy sails noiselessly over the ground with feet pointed forward and claws ready to close, but Puffy, unable to fly, stalks across the floor, his head pushed forward, and his feathers drawn away from his legs.

As the spring of 1889 came on, the Owls became tuneful after their kind. The quality of their sounds suggested feline music, while their accent and metre often aroused my roosters to responsive crowing. They seldom hooted more than once or twice, and then in the early evening.

With the coming of warm weather and the return of birds in the spring of 1889 I began a series of experiments with Puffy which proved of considerable interest. I had found that he was willing to be carried about while perching on a short stick. Taking him in a basket to some woods in the suburbs of Cambridge, I displayed him to the Robins, Pigeon Woodpeckers, Vireos and Warblers which chanced to be at hand. No impressario ever was more delighted at the success of a new star. A full house gathered at once. Armed with a field glass I had the satisfaction of studying at short range the whole bird population of the neighborhood. The Robins, Brown Thrushes and Pigeon Woodpeckers were the noisiest, the Oven-birds and Red-eyed Vireos the most persistent, the Chickadees the most indignant. The Woodpeckers went so far as to fly past the Owl so close as to brush his feathers and make him jump at each charge. On May 12, during a three hours' walk, I saw over forty species of birds, many of which—as for example, Nashville and Prairie Warblers—I had unusual and ample time to study through my glass, thanks to their interest in the Owl and consequent indifference to me. It was not, however, until my long vacation in Chocorua, beginning July 6, that I really had time to ascertain the full value as a magnet of my patient little bird companion.

The Owls made the journey back to the mountains with perfect composure. On being returned to their piano-box cage they promptly sought their respective corners, and showed in many ways their recognition of old surroundings. This power of memory was even more strongly shown on their arrival in Cambridge in October, 1889, when Fluffy flew across the cellar in search of a favorite perch which had been removed, and the absence of which caused him to end his flight in an ignominious tumble.

On my arrival at Chocorua I began to keep systematic account of all birds seen each day, making careful allowance for birds seen twice in the same day. Between July 6 and Oct. 14, I recognized 9,782 birds, representing 95 species. On nearly half the days in this period Puffy was my companion on my walks and rides. At first it was not easy to induce him to leave his cage and accompany me, but after a few lessons he consented to step from his perch upon the short pine stick on which I used to carry him, and to remain clinging to it while I walked or ran, scrambled over ledges, or forced my way through thickets and brambles. He went more than once to the heights of Chocorua; passed hours travelling through dark woods and high pastures; or perched resignedly on the sharp prow of my Rushton boat, watching dragon-flies skimming the surface of the lake, and his own image reflected in the water. In the woods if I held him too near a tempting log or projecting branch he would hop off. Sometimes he would weary of my walking, and, jumping to the ground, would scurry away to cover and snap his beak angrily if I poked his perch in towards him and told him to "get on." As the summer wore on he grew more and more obedient and less inclined to nip my fingers on the sly as he had a way of doing when I first carried him about. This winter I have trained Fluffy to step up beside his mate and submit to being carried around the house on a perch.

Whenever on my summer walks I came to a spot which I wished to 'sample' for its birds, I would place Puffy on a bending sapling, and hiding in the neighboring foliage, I would 'squeak' by drawing in my breath over the back of my hand, and attract the attention of any birds which were near by. Usually in the deep woods the first comer was a Red-eyed Vireo, Chickadee, Hermit Thrush, or Oven-bird; but whichever it chanced to be, an alarm was almost sure to be given that would bring birds

from all directions eager to see the cause of disturbance. Even when I was imperfectly concealed, the irritated crowd paid little attention to me, provided I kept reasonably quiet. Sometimes I would leave the Owl in comparatively open ground on a boulder in a pasture, or a stump in a meadow. Then his favorite position was with his head tipped directly backward and his eyes, half closed, fixed either on the sun or a spot not ten degrees from it. I never could fully understand this attitude, but I soon found that the Owl was keenly alive to anything passing skyward, for if a Hawk or Crow came into view far away in the deep blue, Puffy's gaze was instantly turned full upon the growing speck, the eyelids partly closed and a most intent look coming into his eyes. Again and again Puffy has seen Hawks or Gulls overhead which my eyes, although unusually far-sighted, have at first been unable to discern. On one eventful day he showed me 334 Hawks sailing southwest under the pressure of a stiff northeast gale. It was September 10, one of the later of the days when the fires were raging among the forests along the St. John River. The Hawks were most of them flying very high. I saw none before 9 A. M. or after 2.15 P.M. I think Puffy saw every one of them. It mattered not whether they came singly or in bunches of twenty to forty, his ever ready eye was upon them as soon as they came into view. In spite of this marvellous power of detecting moving objects in a bright light, my pets often utterly ignore some dainty morsel merely because it does not move. Their sense of smell is either weak or uncertain in its action. Their hearing on the other hand is acute, although not depended upon in the same degree as their sight.

Of the various families of birds which Puffy annoyed during the summer of 1889 none were more distressed and angered by his presence than the Woodpeckers, Thrushes, and Vireos. In every hemlock swamp the Yellow-bellied Woodpeckers and Flickers said their say against his character with petulant emphasis. The Flickers often flew close to his head. Downies and Hairies liked him no better, but were less demonstrative. It was when a venerable and fiery-tempered Logcock caught sight of him on August 21, that the full force of Woodpecker eloquence was let out. Puffy seemed to recognize a hereditary foe, for before the Pileated came into my view the Owl suddenly changed his

appearance from rough-feathered and sleepy content to an astonishing resemblance to an old moss-grown stump. He effected the transformation by standing up very straight, nearly closing his eyes, and making his feathers lie absolutely sleek against his attenuated body. Once on another occasion when he ran away from me, he climbed to the top of a small oak stump and made himself look so like a continuation of it that I passed him four times without detecting his presence. Not so the Pileated, for with a shrieking cackle, his crest gleaming in the sunlight, he flew at the Owl so savagely that I expected to see my pet slain on the spot. He only ruffled Puffy's feathers, however, and made the poor bird unhappy for some time by his discordant cries and frequent flights and counter flights.

Of the Thrushes, the Robins took the Owl most to heart. More than once in black cherry time I have seen sixty to a hundred of them within twenty-five feet of him. Their blended cries always drew Hermits and Swainsons from the woods, Cedarbirds from their cherry feasts, and detachments of Warblers from woods and meadows. The Veeries seemed to care least about their enemy; the Hermits said little, but did some hard thinking. The Swainsons, especially after sunset, had a good deal to say in a refined way, flirting wings and tail meanwhile. The numerous Catbirds and occasional Thrashers were coarsely abusive. Through it all Puffy made no remarks, and seldom stirred; he found out long ago that he could not catch birds.

The ubiquitous Red-eyed Vireo never wearied of staring at Puffy, and firing at him his suspicious, expostulating 'cree'! By roadside and meadow, upland pasture, and in the deeps of the beeches, the Red-eye was always present. Even in the haunts of the Juncos and White-throated Sparrows on the high ledges of Chocorua he was not absent. My count of birds in July showed him to be inferior in numbers only to the Barn Swallow, the Cedarbird, and the Robin. Far less numerous, but a leader among the haters of the Owl, was the Blue-headed Vireo. I had seen little of the bird in previous seasons, but Puffy seemed to draw one or more of them from every considerable area visited. Their scolding reminded me of an angry June-bug in a bottle.

As a rule the Sparrows cared little for the Owl. Purple Finches would come and look him over, the female making a sweet little note of inquisitive protest, and then go away.

Goldfinches did about the same, showing no anger. Grass Finches sat about on boulders and said little, and their friends, the Field Sparrows, behaved similarly. In large swamps one or two Rose-breasted Grosbeaks generally came to see what caused so much outcry but they never approached close to the Owl. During the flight of Juncos, White-throats, and White-crowned Sparrows in October, these species seemed to care almost nothing about Puffy after a first bustling visit of inquiry.

A bird of great individuality and irregular distribution is found in the Chocorua country in considerable abundance. I refer to the Great-crested Flycatcher, which, by the way, always places snake skins in those of its nests that I find. No amount of bird clamor will bring this self-contained and suspicious citizen near my Owl. He has his own affairs to care for, and he has a contempt for brawls and gossip. Similar indifference was shown the Owl in a less marked way by the smaller Flycatchers, but the Kingbirds maintained their reputation for bullying, by attacking Puffy and striking him lightly again and again by well-directed darts from above.

The Swallows and Swifts delighted to tease the Owl by dashing past him and fanning him with their wings. They showed no fear or hatred. Kingfishers took no notice of him. The Black-billed Cuckoo came near, and had a good deal to say in a reproachful voice, but its controlling emotion seemed to be curiosity rather than fear. Late one afternoon in August (the 2d) I placed Puffy in the midst of a white birch grove near a brook. A Cuckoo opened the opera and brought some Vireos including two Solitaries. Their explosions were audible a long way, and for a moment or two the air seemed full of birds, nearly all Warblers, and all coming towards the Owl. I could not count them; they came by scores and swarmed about incessantly like bees. Most of them were Black-and-white Creepers, Black-throated Greens, Chestnut-sideds, Black-and-yellows, Canadians, and Redstarts, young birds predominating. I never expect to see more Warblers in one noisy bunch. As a rule, however, a glance or two seemed to satisfy them, and they went off after their suppers. Of all the Warblers, the Oven-birds were the only ones at all persistent in abusing Puffy. They would come quickly and stay long, with ruffled feathers and anxious notes. One day (July 14) while exploring some dense

spruce thickets on a high ridge of Chocorua I came across a pair of Blackpoll Warblers. They were much excited by the Owl and joined with Juncos and White-throats in prolonged complaining at his presence. A White-winged Crossbill, flying by at the moment, alit and looked us over, but was apparently not at all interested in Puffy.

Another bird which never showed any special emotion on seeing the Owl, no matter what the season, was the Scarlet Tanager. As a rule it took no notice of the Owl's presence. Cedarbirds were similarly indifferent even when the Owl was near their nests or young.

Crows and Blue Jays showed great hatred of the Owl. In the late summer the Jays prowled about in considerable flocks. By 'squeaking' I could draw them near enough to see the Owl, and then the harshest and most violent kind of bird abuse would be poured out on Puffy's head. Jays certainly have a broad knowledge of profanity. The Crows were scarcely less demonstrative; circling low over the Owl, they made the woods ring with their angry clamor. I found that I could attract them by hooting like my pets.

As a rule the Hawks cared little for the Owl. I shot one young Cooper's Hawk near its nest because my calling and the Owl's moving about induced the creature to fly up, tree by tree, until within range. On July 23 while 'squeaking' I was astonished to see an *Accipiter velox* make a dash at Puffy, scaring him into his stump-like condition of plumage and attitude. I continued to 'squeak', and the Hawk flew straight at my head, grazed my face, and lit near by. Soon a second came, but was more wary. I amused myself with them for half an hour, and again on another day a week later. On no other occasion do I remember a Hawk's taking any notice of Puffy, although in many instances he has betrayed their presence by his change of shape and expression. Once while walking with him along the shore of Chocorua Lake he changed his whole appearance in the twinkling of an eye, and as I turned to follow his gaze I saw an Eagle strike the water near by, dashing the foam high into the air.

About sunset on August 12, 1889, I heard a Barred Owl hooting near a small lake close to the foot of Chocorua. Two of us set out at once with guns and reached the crest of a kame near the lake just as the moon rose. After waiting quietly until weary,

I began hooting, and to my surprise and delight an Owl responded from a tree close by. I hooted again; it came nearer. Then I 'squeaked,' and the next second I hastened to hide my head in the bushes, for the wings of an Owl had brushed my face in the darkness, making cold shivers run down my back. We fired three times at this Owl and another which joined him, but failed to kill either. After amusing myself and others several evenings by calling the Owls in this way, I took Puffy with me and placed him on a swinging bough where he was plainly visible to crepuscular eyesight. Several Swainson's Thrushes found him out before twilight faded, and complained softly at his presence. When all was still, I hooted, and soon an Owl replied from the farther shore of the lake. Continuing to call, I had the satisfaction of seeing my bird fly close over Puffy's head and alight within easy range, another Owl at the same time beginning to hoot close by. I shot one and was satisfied. Puffy and Fluffy always show great excitement when wild Owls hoot at night, and occasionally Fluffy replies.

The only other Owl which I have seen thus far in the Chocorua region is the Acadian. On July 18, about six P.M., listening to four Great-crested Flycatchers signalling each other in a wooded pasture, I noted an unusual commotion among Robins, Hermits, and Vireos in a bunch of alders not far away. Creeping in, with Puffy held before me, I saw the scolds surrounding a buff-waistcoated young Acadian perched about five feet from the ground on an alder. He saw Puffy, and Puffy looked at him with interest and attention. The agony in the little bird's yellow eyes was pitiful. He gazed long, and then, turning his head slowly away, sailed noiselessly out of sight, followed by the gossips.

There are several of the Chocorua birds which I have not named in connection with the Owl. The Bluebirds seemed grieved to think anything so wicked could exist. They perched near him and seemed to be trying with their sweet tones to induce him to give up being an Owl. The Kinglets cared nothing for him, even when their curiosity was aroused by the abuse of Chickadees, who were among the noisiest of Puffy's visitors. Both Nuthatches are common near Chocorua, and both showed by brief, business-like remarks what they thought of Puffy. Winter Wrens told Puffy plainly that he was a thief. The Indigo-bird was one

of the few Finches which seemed much disturbed by him. The Towhee showed moderate excitement. The *Icteridæ* are uncommon in the Chocorua region, and none of them met Puffy in his native meadows. About Cambridge, however, Orioles, Red-wings, Crow Blackbirds, and Cow Buntings all showed marked excitement and anger at his presence. Nighthawks and Whip-poor-wills have not met Puffy. I hope next summer to arrange an interview with a Whip-poor-will who haunts my pasture bars. Once or twice Hummingbirds have buzzed a moment near Puffy's head, as if adding their small tribute of hatred to the general estimate of his character.

None of the few species of game and water birds found near Chocorua Lakes have seemed to show any interest in the Owls.

I have recently taken Puffy to Chocorua in the season of snow. Of the eight species of birds met only four saw the Owl. They were Chickadees, Red-bellied Nuthatches, Redpolls, and Blue Jays. They all scolded him, but not with the average summer emphasis. The Redpolls showed only mild curiosity which soon expended itself in gentle reproachful phrases. Puffy did not mind cold, but the light from the snow seemed to blind him. Indoors he held two young hounds at bay, and made their lives miserable by refusing to allow them to come near his corner without risking an attack from his beak and claws. With dogs and cats outdoors he always shows fear unless they come to close quarters; then, as indoors, he spreads and arches his wings, raises his feathers on his back, lowers his head, and snaps his beak, sometimes making swift rushes with an expression so fierce that I have yet to find any quadruped willing to defy him.

A SUMMARY OF OBSERVATIONS ON THE BIRDS OF THE GULF COAST OF FLORIDA.

BY W. E. D. SCOTT.

(*Concluded from p. 22.*)

Anthus pensilvanicus. AMERICAN PIPIT.—In the interior of the State I have noted this species as early as November 1. This was at Ocala in 1879. On the Gulf coast the birds appear in small numbers the latter part

of November, but are apparently never very common, nor regular migrants as far as time of appearance is concerned. Mr. Atkins noted "a flock of ten or twelve individuals at Key West on December 7, 1888, and a similar flock later in the same month."

Mimus polyglottos. MOCKINGBIRD.—An abundant resident on the Gulf coast of Florida. In the region about Tarpon Springs the birds begin to mate and are in full song about February 1. The earliest note of birds in song at this point is January 17. There are at least two broods, and probably three in some cases, reared during the breeding season, which lasts from the first of February to the last of July. Then there is a period of about two months when it is unusual to hear the song, but in October and November a secondary season of song begins which seems to conclude with the latter month, the birds beginning to sing again about the middle of January.

Mr. Atkins found the birds abundant residents at Punta Rassa, and says that at Key West they are "common in winter and in spring, but not detected breeding." This was during the years of 1887 and 1888. Later observations, in 1889, revealed a *single* pair breeding on the Island, and this was the only pair observed during the past summer. It is, therefore, fair to conclude that the birds are rare during the breeding season on the Island of Key West.

Galeoscoptes carolinensis. CATBIRD.—A common migrant and winter resident in the vicinity of Tarpon Springs, but not detected on the Gulf coast during the breeding season. The first birds arrive early in September, and they remain in numbers till April 1 to 10. Mr. Atkins's observations at Punta Rassa and at Key West, coincide with the above notes, but at Key West he observed two on May 25, 1889; these were not seen later.

Harporhynchus rufus. BROWN THRASHER. — This species' time of appearance and leaving on the Gulf coast appears to coincide very closely with that of the Catbird. Mr. Atkins found it at Punta Rassa after October 10, 1886, but only met with the species on three occasions in the region about that place. He has not observed it at Key West.

Thryothorus ludovicianus miamensis. FLORIDA WREN.—In 'The Auk', Vol. V, p. 187, this subspecies was referred to as the representative form of all the Gulf coast of Florida at least as far north as the mouth of the Anclote River. Since then a very large series has come under my observation, confirming this opinion. This series of birds embraces individuals of both sexes, and approximately of all ages, and consequently the seasonal variation in coloration is clearly shown, as well as some interesting phases of individual variation, and finally the variation due to age. Mr. J. A. Allen has kindly examined and compared this material with representatives in the collection of the American Museum of Natural History in New York.

I quote as follows from letters from Mr. Allen, whose views coincide in detail with my own.

"Of the forty-six Wrens (*Thryothorus*) thirty are males and sixteen

are females; they include thirteen birds of the year, which differ from the adults in being much paler, as well as smaller. Below they are dull, rather strong, buffy white, with faint blackish edges to the feathers of the jugular region and sides of the throat, varying in distinctness in different specimens. Above, the head is darker, and the chestnut is of a duller, darker tone.

"The range of individual variation in color in the adults, especially of the lower surface, is very marked, the color below varying from very pale to very strong cinnamon, with or without blackish bars on the flanks. There is a less marked variation in the tone of the reddish chestnut of the upper parts.

"There appears to be no sexual variation in color, several of the strongest colored birds being females. There is, however, a slight average difference in size, the wing in the females averaging one sixth of an inch shorter than in the males.

"Two of your specimens are exceptional in having the flanks strongly barred with black. One is a male (No. 6052, Tarpon Springs, June 7, 1888), the other a female (No. 6064, Tarpon Springs, June 13, 1888). The female is dark cinnamon below, the male very pale cinnamon. Both are adult birds. A number of other specimens show traces, more or less distinct, of blackish bars on the flanks, apparently about one specimen in ten. Those with broad, heavy black bars on the flanks are apparently in the ratio of about one to twenty-five. The heavily barred, strongly colored No. 6064 bears a striking resemblance to Mexican (Tampico) specimens of *Thryothorus l. berlandieri*, the latter differing in smaller size, a longer, slenderer bill, less intense chestnut above, and grayer head, wings and tail.

"Your series shows in a very interesting way the seasonal variation in color between summer and winter plumage. The winter (December to April) birds are much more intensely red above, and much stronger (almost reddish) cinnamon below, than the summer (breeding) birds, taken in May, June and July.

"I refer all of your specimens, and also a considerable series collected near Micco, on the east coast of Florida, by Mr. Frank M. Chapman, to *Thryothorus ludovicianus miamensis*. On the other hand Mr. Chapman's series taken at Gainesville, Florida, in winter are all referable to true *ludovicianus*. How much below Gainesville *ludovicianus* may extend in winter, or how much above the Indian River district of the east coast, and Tarpon Springs on the west coast, *miamensis* is found, cannot at present be determined. It seems probable, however, that the habitat of *miamensis* will include at least the southern half of the Florida peninsula, and that *ludovicianus*, even in winter, may be restricted to the northern half and northward.

"As to the differences characterizing the two forms, *miamensis* is much the larger, and much more strongly colored. Thus ten males of *miamensis* taken in June and July average as follows: Wing, 2.46; tail, 2.19; culmen, .70 inch; while ten males of *ludovicianus* from various localities

(New Jersey southward to North Carolina) average: Wing, 2.27; tail, 2.04; culmen .63 inch.

"The Tarpon Springs birds are evidently less differentiated from *ludovicianus* than Miami birds, on which *miamensis* was originally based, yet they are already so different from even north Florida birds that it seems better to refer the Tarpon Springs birds to the southern race."

I am greatly indebted to Mr. Allen for the very careful diagnoses and observations above quoted, and heartily concur in all he says.

Mr. Atkins did not find representatives of this subspecies at all commonly at Punta Rassa, where his only record is one taken on April 12, 1886. He has furnished me with no records for the Island of Key West.

Troglodytes aëdon. HOUSE WREN.—A common migrant, arriving later in the fall, remaining throughout the winter in numbers, and leaving early in April for the north. The latest spring record at Tarpon Springs is of a male bird taken April 12, 1886. This specimen was moulting. Mr. Atkins says the species is a common winter resident at both Punta Rassa and Key West.

Cistothorus stellaris. SHORT-BILLED MARSH WREN.—A rather common winter resident in suitable localities in the vicinity of Tarpon Springs. Here I have taken the birds in both salt and fresh water marshes, though marshes of sedge grass where the water is brackish and the sedge not very high nor dense seem to be preferred. The birds arrive at this point in September and remain until April 1 to 10. Mr. Atkins has not met with the species at either of the points where he has collected.

Of the thirty individuals that have come under my notice at this point, the only marked variation in color is in the intensity of the buffish of the under parts, which varies from pale but decided buff to a deep shade approaching cinnamon. There is also a decided tendency to blackish barring on the flanks, which though absent in many individuals is very decidedly conspicuous in others. About one third of the birds examined have this characteristic more or less pronounced.

Cistothorus palustris. LONG-BILLED MARSH WREN.—A rather rare winter visitor in the vicinity of Tarpon Springs. About fifteen individuals have been collected in December and January in the past few years. Mr. Atkins has been unable to detect the presence of this species at either Punta Rassa or Key West.

Cistothorus marianæ. MARIAN'S MARSH WREN.—This species is an abundant fall, winter, and spring bird in all suitable localities in the region about Tarpon Springs and to the north of the mouth of the Anclote River at least as far as Cedar Keys, and probably on the Gulf coast of the State from that point northward and westward. I have found them most commonly on the salt water marshes at the *head* of tide water, but have detected them in the saw-grasses of the fresh water lakes and ponds that I have investigated for at least ten miles back from the coast. It seems probable that a few representatives breed, at least in the vicinity of Tarpon Springs, for though no nests or eggs have been obtained, I

have seen in all three or four *old* nests of Marsh Wrens, and the birds are present, though rare, in the marshes in summer.

In habits they are very like their near allies. The period of song does not seem to be wholly suspended, so far as I am aware, at any season. The season of song, however, really begins about the last week in January, and after that time it may be heard constantly until the middle of March or first of April, when most of the birds have left this region.

In character the song is similar to that of *Cistothorus palustris*, but the difference, though difficult to describe, is easily appreciated by the listener.

Sitta carolinensis atkinsi, subsp. nov.

FLORIDA WHITE-BELLIED NUTHATCH.

After carefully considering the representatives of *Sitta carolinensis* that occur in the region about Tarpon Springs, there appear to be such constant and regular deviations in color, size, and relative proportions of the different parts, from the representatives of the species collected from Massachusetts southward to North Carolina, that I feel warranted in calling attention to so well marked a form as occurs in this portion of Florida, and in suggesting the recognition of a new subspecies to be called *Sitta carolinensis atkinsi*. This name is given to record in a slight way my great appreciation of the careful work done by my friend Mr. John W. Atkins of Key West, on the birds of that portion of Florida.

Types, 3940 (Coll. W. E. D. S.), ♂, Tarpon Springs, Florida, April 21, 1887; 3164 (Coll. W. E. D. S.), ♀, Sept. 27, 1886, Tarpon Springs, Florida.

General characteristics.—Average of wing, as compared with northern birds, .20 in. smaller in males, .15 in. smaller in females. Bill relatively much longer and slenderer. Light markings of tipping of the coverts and quills of the wings decidedly narrower. A little less white in the tail. In the female birds the *black* of the top of the head and nape is *pronounced*, and it is difficult to distinguish the sexes easily, and in some cases impossible, by the color of these parts.

Average size of *Sitta carolinensis* as given by Mr. Robert Ridgway (Manual N. A. Birds): Wing, 3.60; tarsus, .72-.75; culmen, .84 inch. Wing, culmen and tarsus of four males and five females from vicinity of Tarpon Springs:

					Wing.	Culmen.	Tarsus.
3940.	♂ ad.	Tarpon Springs, Fla.		April 21, 1887.	3.28	.72	.70
3163.	♂ ad.	"	"	Sept. 10, 1886.	3.40	.74	.68
7579.	♂ ad.	"	"	Jan. 1, 1890.	3.44	.71	.69
7578.	♂ ad.	"	"	" " "	3.38	.73	.71
3161.	♀ ad.	"	"	Sept. 17, 1886.	3.40	.69	.70
3165.	♀ ad.	"	"	" 27, "	3.34	.78	.70
3510.	♀ ad.	"	"	Oct. 21, "	3.30	Broken.	.72
3164.	♀ ad.	"	"	Sept. 27, "	3.21	.72	.68
5000.	♀ ad.	"	"	Feb. 13, 1888.	3.26	.73	.69

Of these five females 3161, 3165, 3164, and 5000 are all deep lustrous black on head and nape without traces of grayish or plumbeous washing, while 3510 has these parts slightly suffused with plumbeous.

A young male nestling bird taken on April 21, 1887, just after leaving the nest, has the black of head and nape only slightly less lustrous black than in the adult birds.

The variation in the Florida form is mainly in the direction of the western subspecies *aculeata*, but the bill is less attenuated; the gray of the secondaries is purer, and there are other minor differences of coloration.

The birds do not appear to be common about Tarpon Springs, but are residents, and breed early in March.

Sitta pusilla. BROWN-HEADED NUTHATCH.—A rather common though locally distributed species in the region about Tarpon Springs. Here the birds are resident, and breed from early March to the latter part of April. Mr. Atkins took the species at Punta Rassa, where he considered it rare, but has not found it on the Island of Key West.

Parus bicolor. TUFTED TITMOUSE.—A common resident on the Gulf coast, at least as far south as Charlotte Harbor. Mr. Atkins did not record it at Punta Rassa nor has he found it at Key West.

Parus carolinensis. CAROLINA CHICKADEE.—Not quite as common as the last but apparently of about the same distribution. Resident, and breeds, in the region about Tarpon Springs. Mr. Atkins has not met with it at either of the points where he has collected.

Regulus calendula. RUBY-CROWNED KINGLET.—Common migrant and winter resident about Tarpon Springs. Arriving about November 1, they remain in numbers till late in March. Mr. Atkins has not recorded them at the points where he has collected.

Polioptila cærulea. BLUE-GRAY GNATCATCHER.—A rather common resident in the region about Tarpon Springs breeding in April in numbers. Mr. Atkins regards it as a migrant at both Punta Rassa and Key West, at which points it is common. It is absent from these localities from about April 1 till the last of July or middle of August.

Turdus mustelinus. WOOD THRUSH.—A rather rare spring and fall (?) migrant on the Gulf coast of Florida. I have found them in the vicinity of Tarpon Springs in early April on two occasions. Mr. Atkins found them rather common at Key West on April 29, 1887, and saw the last ones on May 3, 1888.

Turdus fuscescens. WILSON'S THRUSH.—Not obtained in the vicinity of Tarpon Springs nor at Punta Rassa. Mr. Atkins found the birds common at Key West on April 28 and May 3, 1887. They were not observed later.

Turdus aliciæ. GRAY-CHEEKED THRUSH.—Taken on rare occasions in the vicinity of Tarpon Springs in April. On April 28, 1887, two were noted, and one taken. Not recorded by Mr. Atkins at Punta Rassa nor at Key West.

Turdus ustulatus swainsonii. OLIVE-BACKED THRUSH.—Not observed

in the vicinity of Tarpon Springs, but Mr. Atkins found them at Key West rather commonly on April 28, 1887, and again saw them on May 3 of the same year.

Turdus aonalaschkæ pallasii. HERMIT THRUSH.—Common migrant and winter resident on the Gulf coast. Mr. Atkins found it common in winter at Punta Rassa and has a single record of it at Key West in January, 1889.

Merula migratoria. AMERICAN ROBIN.—An irregular migrant, but present in small numbers almost every year, and sometimes abundant. Appears late in December, and remains till the 10th of March which is the latest record. Mr. Atkins says it was irregular in its visits to Punta Rassa, but common at Key West in December and January, 1887.

Sialia sialis. BLUEBIRD.—A rather common resident, and breeds, at all points I have visited on the Gulf coast of Florida. Mr. Atkins has furnished me with no notes regarding the species.

In this paper I have attempted to bring down to date the latest information regarding the birds of the region in question, but notes accumulated which treat of the species dealt with in the preceding parts (the publication extending back some two years) seem worth presenting, and I hope to offer in an early number of 'The Auk' a synopsis of the series, with such additional information as will bring the latest knowledge obtained before the readers of this journal.

ON THE CHANGES OF PLUMAGE IN THE BOBOLINK (*DOLICHONYX ORYZIVORUS*).

BY FRANK M. CHAPMAN.

THE MARKED seasonal changes which occur in the plumage of the Bobolink have ever been made a prominent fact in the life-history of this well-known bird, but I am not aware that the subject has been studied with a complete series of specimens representing each stage of the bird's plumage as it appears throughout its range. For this reason, perhaps, we may account for the generally accepted statement, that the change in the male from the female-like plumage of winter to the black and yellow costume of spring, occurs without loss of feathers but by a change

of color in the feathers themselves, accompanied by a wearing away of their more exposed portions, resulting in the breeding dress with which we are familiar. That this is in part true, there can be no doubt, but that this change is attended by a complete moult, is apparently proved by the material before me.

Before further discussing the subject it may be well to briefly review the seasonal and sexual costumes assumed by the Bobolink. The nestlings of both sexes resemble each other and differ from the bird of the year in having the entire plumage, particularly below, of a more buffy color; there is a necklace of faint dusky spots across the breast and the flank streaks are almost indistinguishable. This plumage is soon followed by the well-known Reed-bird dress in which, perhaps, the males *average* slightly brighter. The black streaks on the flanks and sides are now clear and well defined, the feathers of the breast have generally a small, black, basal shaft-streak, and a spot of the same color occasionally appears on the feathers of the throat. In the winter this plumage by fading and abrasion loses much of its brightness and the bird then closely resembles the worn breeding female. It is not necessary in this connection to describe the costumes of the adult female, nor have I material to fully discuss the subject. As far as I know, the adult bird in the fall cannot be distinguished from birds of the year.

In calling attention now to the main object of this paper, the costumes of the male bird, without at this moment dwelling on his appearance in full nuptial dress, we will first consider the change which follows the close of the breeding season. The bird now undergoes a complete moult, losing his entire plumage even to remiges and rectrices, and acquiring a new dress which at first glance is very similar to that of the bird of the year. Closer examination, however, shows well-marked differences. In the adult bird the feathers of the crown, particularly those of the median line, have larger black areas and are less regularly bordered with brownish: the secondaries are not terminated with a narrow edging of white, and the tertials lack the whitish border which is generally seen on those of the young bird. On the sides and flanks the markings are somewhat heavier but resemble those of the young bird, while the black basal areas on the feathers of the throat and breast are larger and more numerous, in some cases occupying the basal three fourths of the feather,

the buff then appearing as a terminal and slightly lateral border. This plumage then, while more nearly like that of the young bird, is in a measure intermediate between it and the breeding male, and we can readily understand how an examination of this plumage alone would easily mislead one into supposing the bird was acquiring the black male dress by a change of pigment in the feathers, to be followed by a wearing away of their exposed yellowish borders.

Our interest now centres in an adult male specimen, No. 32,783 of the American Museum collection, taken March 1, 1886, by H. H. Smith at Corumbà in southwestern Brazil. This bird is undergoing a complete moult, but has nearly acquired a new plumage, its exact condition being as follows: Above, the tertials, four secondaries, the first primary and alula of either wing belong to the old plumage, the balance is entirely new, but the scapulars, some of the wing feathers, and the tail have not completed their growth. The plumage of the under surface is more nearly complete, the old feathers being confined to the sides of the throat, abdomen, and flanks; in its dorsal plumage this bird bears a striking resemblance to the adult fall male before described. The crown lacks a median line, but the feathers have an even wider border of brown which, however, is now strictly terminal. The feathers of the nuchal band are without black shaft streaks and the exposed portions are of a deep rusty brown color, fading gradually to a white base; the interscapulars are black with an almost complete border of brownish yellow, similar, therefore, to those of the fall bird, but the black is deeper and of greater extent; the scapulars which have appeared are white for their basal three fourths, with the terminal portion brownish yellow or olivaceous-brown; the wings and coverts, referring now to the new plumage, are similar to those of the adult spring male but the feathers have wider and darker borders; the lower back is in poor condition, but apparently resembles that of the breeding bird; the feathers of the rump resemble the scapulars already mentioned; the tail, so far as it has appeared, agrees with that of the spring male. Below, the bird's plumage is most interesting; its general appearance may be described as black, heavily veiled with yellow,—all the feathers having a long terminal fringe of this color, which in no instance descends to the side of the feather. On the feathers of the breast this fringe averages in

width .15 inch; the centre of the abdomen is still occupied by feathers of the winter plumage, which are faintly bordered with yellowish; in the flanks still remain a few longitudinally striped feathers of the winter dress, but these are being replaced by black feathers terminally fringed similarly to those of the breast. Allowing for the slight and unimportant changes a completion of the moult will cause, it will be seen that we have here a bird which, although it has acquired its final spring plumage as far as feathers are concerned, still differs greatly from the black, yellow and white Bobolink we are accustomed to see. My material fortunately illustrates the succeeding changes which occur before the bird may be said to have gained its perfect nuptial dress.

An examination of the brown- or yellow-tipped feathers shows that their barbs are separated for at least their apical third, and that the brown or yellow color commences at or near the point of separation. Being thus without the mutual support furnished by an interlocking of their delicate barbules, these fringe-like terminations soon disappear before the constant wear and tear to which they are subjected. As we might suppose there is some regularity in the manner in which succeeding parts of the bird's plumage lose these terminal barbs, and they disappear first from the more exposed portions and persist longest where they receive the most protection. The head and breast, therefore, seem to be the first to become fully black, while the most perfect specimen before me (one of several kindly loaned by Dr. A. K. Fisher) still shows traces of yellow on the sides, flanks, and lower abdomen. In the nuchal collar, scapulars, and rump abrasion is evidently assisted by a fading of the more exposed portion of the feather.*

All these changes are closely correlated with a change in the color of the bill. In the Corumbà specimen it resembles that of the fall and winter bird; the mandible is reddish brown, the maxilla flesh color. The final black first appears on the anterior portion of the mandible and reaches its base before a similar

*While the loss of these delicate terminations is largely effected by actual abrasion, or even by the mere action of flying, it is evident that, losing their vitality, and lacking protection, they become in a measure deciduous, and drop off without the assistance rendered by a mechanical abrasion. The subject is an important one and deserving of more attention than has been accorded it. A similar change occurs in many other genera, for instance: *Otocoris, Agelaius, Scolecophagus, Passerina, Junco, etc.*

change is effected in the color of the maxilla, which, however, does not attain the same degree of jet blackness.

The second complete moult of the year is now finished, and again we have the rollicking Bobolink of our fields and meadows.

OBSERVATIONS ON SOME OF THE SUMMER BIRDS OF THE MOUNTAIN PORTIONS OF PICKENS COUNTY, SOUTH CAROLINA.

BY LEVERETT M. LOOMIS.

(*Concluded from p. 39.*)

29. **Cyanocitta cristata.** BLUE JAY.—It is remarkable that this bird, in the mountains, seeks a home on the wild and remote summits away from the settlements, while at Pickens Court House, only a dozen miles away, it is a familiar inhabitant of the shade trees of the streets and door-yards.

30. **Corvus corax**———? RAVEN. — The Ravens of this district are eminently birds of the mountain tops, venturing into the settled valleys only during brief excursions in search of food. They are said to descend to these lower grounds to feed on carrion more freely in winter than in summer. Their more frequent presence at the former season is ascribed to increased scarcity in the food-supply, but probably they are actually more abundant, re-enforcements coming from the higher points of North Carolina. Whenever the chance offers, their nests are broken up and the young destroyed, but in spite of persecution they continue to hold their own, and may justly be ranked as tolerably common. (See also Auk. VI, 277.)

31. **Corvus americanus.** AMERICAN CROW. — Occurs as commonly here as elsewhere in the up-country during summer.

32. **Spinus tristis.** AMERICAN GOLDFINCH. 'LETTUCE-BIRD.'—Rather common, especially in the Oolenoy Valley.

33. **Spizella socialis.** CHIPPING SPARROW. — A very common songster in suitable situations. On Mt. Pinnacle its range extends along the barren ridges, among scattered pines, to the heavy hardwood growth crowning the summit.

34. **Spizella pusilla.** FIELD SPARROW.—In the Oolenoy Valley these Sparrows are very common, but on the heights above they are sparingly distributed, being limited to the clearings. Their musical efforts exhibited the peculiarities characteristic of the species in the lower country.

35. **Pipilo erythrophthalmus.** TOWHEE. 'JOE-REE.' — June 5, while *en route* for the mountains, I shot a male in full song three miles west of Spartanburgh Court House. Another was heard singing later in the day at a mill pond on the Middle Tiger, also in Spartanburgh County. As I was returning home, July 4, through the same County, the call-notes of one were heard on the outskirts of the court-house town, while another sang with effect at my noonday camp, five miles south of it on the Spartanburgh and Union Railroad.

In the vicinity of Mt. Pinnacle it was seen only in the Oolenoy Valley, where it inhabited the scrubby growth of the clearings. It did not appear to be very common. As further showing the extension of this species along the northern boundary of the State during the breeding season, it is pertinent to add that in the early part of July, 1888, I heard two males sing daily at All-Healing Springs, at the foot of Crowder's Mountain — a peak of the King's Mountain chain, just over the line in North Carolina, about forty miles north of Chester.

36. **Cardinalis cardinalis.** CARDINAL. 'REDBIRD.'—Not detected above 2500 feet; common. Though prominent as musicians, their performances lacked the spirit and unction of spring. Along with the 'Joe-ree,' held in considerable ill repute because of alleged depredations on newly planted corn.

37. **Guiraca cærulea.** BLUE GROSBEAK.—A single male was seen, July 2, in the Oolenoy bottoms opposite Table Rock. My attention was directed to it by its song.

38. **Passerina cyanea.** INDIGO BUNTING. — Its vertical range unrestricted. Very common, and in complete song.

39. **Piranga erythromelas.** SCARLET TANAGER. 'PINY WOODS REDBIRD.'— Above 2000 feet these Tanagers were very common, but below this none were discovered. The males sang with unabated ardor through the whole of June. The testes of several examined toward the close of the month were fully developed. Young birds—just on wing—were obtained June 24.

40. **Piranga rubra.** SUMMER TANAGER. 'REDBIRD.' — Up to about 2000 feet they were very common, but above this elevation they appeared to be replaced by *erythromelas*. They continued in good voice during the whole of my last stay.

41. **Progne subis.** PURPLE MARTIN. 'BLACK MARTIN.' — Wherever gourds were put up for their accommodation they were present.

42. **Stelgidopteryx serripennis.** ROUGH-WINGED SWALLOW. 'CREEK MARTIN'; 'BANK MARTIN.' — Seen daily hawking for insects over the bottom-lands along the Oolenoy. Tolerably common.

43. **Ampelis cedrorum.** CEDAR WAXWING.—An example was taken June 22, 1887, on a rocky stream, skirted by rhododendrons, in a heavily wooded ravine near the foot of Mt. Pinnacle. A second specimen was procured, June 26, 1889, in the large timber investing the summit of that eminence, at an altitude of about 3000 feet.

44. **Vireo olivaceus.** RED-EYED VIREO.—The most conspicuous of all

the songsters of the region. Very abundant in woods everywhere, on the highlands and in the valleys.

45. **Vireo flavifrons.** YELLOW-THROATED VIREO.—Common, seemingly confined to the middle and lower elevations. Its strong clear notes were a constant feature in the general chorus.

46. **Vireo solitarius alticola.** MOUNTAIN SOLITARY VIREO.—The Mountain Solitary Vireo is the least abundant member of the family thus far met with in this locality. It is sparsely distributed, occurring chiefly above 2000 feet. Two specimens were secured in the Oolenoy Valley—a female, June 11, and a male, June 13. It is at all times a persistent vocalist. There is a charm in its voice that instantly arrests attention, a charm not alone of rarity, but of melody, singular in sweetness, and peculiar in power of penetration. I am convinced a second brood is occasionally, if not habitually, reared, for a female was taken, June 8, whose ovary plainly indicated that eggs were about to be deposited. The first offspring of this bird, which were well on wing, were still under the care of the parents.

Examples from these mountains—a region of heavy precipitation—show that *alticola* is a strongly marked race. A casual examination is sufficient to reveal the striking differences existing between it and *V. solitarius*. The dark plumbeous of the back and the large size of the bill distinguish it at a glance. There is considerable variation, in individuals, in the coloration of the upper parts. In the most characteristic specimen of my series, mottled plumbeous, dusky and blackish, are the prevailing colors, the green being barely discernible, except on the rump. In a second specimen, representing the other extreme, the plumbeous is of a dusky shade, and much restricted, the green predominating on the rump and blending prominently with the plumbeous on the lower neck and upper back. In one of the young birds referred to above the color of the upper portions is nearly uniform plumbeous-gray. In another, the gray of the back is tinged with green, which increases in intensity until it prevails over the plumbeous on the rump and upper tail-coverts. In typical examples of *solitarius*, and also in intermediate ones, from Chester County, the basal portion of the lower mandible, and frequently the whole of it except the tip, is plumbeous, while in adult mountain birds this part of the bill is uniformly black, or displays but very slight indications of plumbeous. Three birds of the year, however, have the bill similar in color to mature Chester specimens. In adult mountain birds the black in this member is falso noticeably deeper. The whitish edging of the innermost secondaries, in adults, is greatly restricted. In several it is nearlyobsolete. In the young of the year, so far as my knowledge goes, this edging is as extensive as in *solitarius*. It is noteworthy that the example, most eminently characteristic, came from the Oolenoy Valley. It would naturally be supposed that the lowlands would have yielded exemplifications less typical than the highlands. I have never seen an individual, in life, of either style having the tarsi and podium "blackish plumbeous." In every instance these extremities were light gray, usually decidedly plumbeous in cast.

MEASUREMENTS (in millimetres).

Sex.	*Length.*	*Extent.*	*Chord of Wing.*	*Chrd of Exp. Culmen.*
♂	154.94	256.54	81.28	11.68
♂	152.40	254.00	70.75	11.43
♂	152.40	254.00	79.25	11.68
♂	151.64	257.81	81.53	12.45
♂	149.86	254.00	79.50	11.43
♂	149.86	251.46	78.23	11.43
♀	152.40	248.92	77.21	12.19
♀	149.86	238.76	74.17	11.68

47. **Vireo noveboracensis**. WHITE-EYED VIREO.—So far as I am aware, it is confined to the Oolenoy Valley, where it is a common songster.

48. **Mniotilta varia**. BLACK-AND-WHITE WARBLER.—Noted at all elevations. Very common. Although individuals continued to sing to the end of my last visit, still, from the outset, the song season was markedly on the wane. An adult male sang so strangely at the summit of Mt. Pinnacle, June 22, that I found it necessary to shoot it in order to fully satisfy my mind as to its identity.

49. **Helmitherus vermivorus**. WORM-EATING WARBLER.—Decidedly common, in the wooded ravines and coves, from the lower valleys to the crests of the mountains. Young birds—well clothed and steady of wing—were obtained early in June.

50. **Helminthophila chrysoptera**. GOLDEN-WINGED WARBLER.—An adult male in full feather and a bird of the year in ragged plumage were shot, June 29, in a thicket on the edge of a little clearing just below the High-low Gap, at an altitude of about 2500 feet.

51. **Compsothlypis americana**. PARULA WARBLER.—This bird was very common, and sang with vigor as long as I remained. The timbered hollows, from base to apex, were favorite haunts.

52. **Dendroica æstiva**. YELLOW WARBLER.—Rather common in the cultivated valleys. Not observed elsewhere. In full song.

53. **Dendroica pensylvanica**. CHESTNUT-SIDED WARBLER.—Only found at isolated points, and not lower than 2500 feet. The situation where they were most numerous was a small clearing near the High-low Gap. Here as many as five males were heard singing in the course of a few minutes. The testes of males procured June 13 and later were about the size of a small pea. In song through June.

54. **Dendroica blackburniæ**. BLACKBURNIAN WARBLER. But three specimens were obtained—two adult males, in full dress, June 18 and 21, at about 2500 feet; a female, moulting, June 24, above 3000 feet. All were in hardwood timber. The testes of the males were not larger than a pin's head of ordinary size.

55. **Dendroica dominica albilora**. SYCAMORE WARBLER.—A pair, accompanied by their brood, was met with June 23, 1887, among a mixed

growth of pines and hardwood, on a spur of Mt. Pinnacle a few hundred feet above the Oolenoy. The parents and one of the young were secured. The superciliary stripe of the male, in the flesh, was slightly tinged over the lores with yellow for 6.3 mm. In the female the yellow tingeing was scarcely perceptible, and extended only 3.8 mm. In both the yellow was interrupted at the base of the bill by pure white. Dimensions as follows: Male, bill from nostril, 8.9 mm.; length, 127.0 mm.; wing, 64.3 mm.; longest rectrix, 52.1 mm. Female, bill from nostril, 9.1 mm.; length, 127.0 mm.; wing. 61.0 mm.; longest rectrix, 52.1 mm. While not typical illustions, I have placed these examples, without question, under *albilora*, as, in my judgment, they approach that form more nearly than *dominica* proper.

56. **Dendroica virens.** BLACK-THROATED GREEN WARBLER.—I was much surprised to find that the Black-throated Green Warbler was a very common bird at the foot of the mountains, as well as over the higher slopes. Its peculiar song, which was uttered with unfailing emphasis during the entire month of June, rendered it one of the more prominent choristers of the woodland. A well-feathered bird of the year was taken June 10. The testes of all examined were not larger than a small pea.

57. **Dendroica vigorsii.** PINE WARBLER.—Common in congenial situations. Like the Chipping Sparrow, it ranges along the sterile ridges on Mt. Pinnacle to the heavy timber.

58. **Dendroica discolor.** PRAIRIE WARBLER.—In the Oolenoy Valley and other lowlands of the immediate vicinity it is tolerably common in scrubby growth.

59. **Seiurus aurocapillus.** OVEN-BIRD.—On Mt. Pinnacle Oven-birds were very common near the top, but they did not appear to descend below 3000 feet, although locations possessing features similar in character to those occupied occur at lower elevations. On the Horse Mountain, just across the north fork of the Oolenoy from Mt. Pinnacle, they were common as low down as 2000 feet. Near the High-low Gap, at 2500 feet, they were very common. They were also detected at Table Rock. Deciduous woods, chiefly those free from undergrowth, were habitually frequented. In these haunts throughout the day their loud chant fell continually upon the ear I did not find the young on wing until the last week in June. A female taken June 26, had ova as large as BB shot. This suggests that a second hatch is raised, if not regularly, at least occasionally.

60. **Seiurus motacilla.** LOUISIANA WATER-THRUSH.—The distribution of this species is not determined by altitude, but by the presence or absence of running water; thus it is common along the streams, among rhododendrons, at the base of the mountains and up their sides to above 3000 feet. Well-fledged young were taken in a little cove on the north side of Mt. Pinnacle, just below the highest point, on my first arrival, both in 1888 and 1889. At this early date, also, the adults were beginning to moult, and their generative organs were greatly diminished in size. In Reedy Cove (1800 feet) young, but very recently a-wing, were captured several days later, evidencing that the breeding season on the higher grounds is not necessarily tardier than on the lower.

61. **Geothlypis formosa**. KENTUCKY WARBLER.—Indifferent to elevation, these Warblers are everywhere abundant in the wooded hollows, coves, and ravines; these shady retreats constituting their true haunts, though during the cooler hours of the day individuals stray from the near proximity of the water courses to the sunny slopes of the adjacent hillsides. During the height of the season they have few rivals in persistency of song, but as June advances, and the young begin to be abroad, they sing with rather less frequency, though not with less force and spirit. Besides their loud chant, so commonly uttered, I think they have a second and more pleasing song, but of this I cannot speak with certainty, as I never succeeded in detecting one in the act of singing, for the song was repeated only at rare intervals, and always in the seclusion of the rhododendrons, but each attempt to discover the author invariably developed a Kentucky Warbler in the spot whence the sound had issued. When their haunts are invaded, they resent intrusion with loud querulous chirps which are as distinctive as their song notes. Though of retiring disposition, especially early in the season, when their young are hatched they often challenge observation by exhibiting themselves with boldness. The first bird of the year was shot June 20.

62. **Geothlypis trichas**. MARYLAND YELLOW-THROAT.—A common songster in June and July in the open bottoms among the willows and other shrubbery fringing the Oolenoy and its tributaries.

63. **Icteria virens**. YELLOW-BREASTED CHAT; 'MOCKINGBIRD.'—Abundant, particularly in the Oolenoy Valley, ranging along the mountain brooks in the more open places to above 3000 feet. Their presence is always a sure indication of water at the higher levels, and upon more than one occasion have my steps been directed, when thirsty, by their loud notes to spring-heads near the summits. Their eccentric aërial performances were noticed as late as the middle of June.

64. **Sylvania mitrata**. HOODED WARBLER.—At the base of the mountains they were very common in the lesser growth of the woods in the neighborhood of branches, straggling upward to about 2500 feet. The males were very prominent singers during each June. It seemed, however, that they sang less frequently the last year on my first arrival than in former years, but with the progress of the rains there appeared to come a revival of song. First young shot June 13.

65. **Mimus polyglottos**. MOCKINGBIRD.—Through Chester and Union Counties Mockingbirds were abundant along the wayside, constantly darting down at my bird dog as he trotted ahead of the wagon. As Spartanburgh Court House was approached, from the south, they became less and less numerous. Very few were seen between Spartanburgh and Greenville, though around the suburbs of the latter town they were quite plentiful. The three previous seasons I found them common about Easley, but none were observed nearer the Oolenoy Valley than Pickens Court House.

66. **Galeoscoptes carolinensis**. CATBIRD. — Common about the settlements. Continued in full song through June.

67. **Harporhynchus rufus.** BROWN THRASHER. 'THRASHER.'—Not abundant, and mainly confined to the open valleys. A male was shot, while singing, on the edge of a clearing at about 2000 feet, which was the highest altitude at which the species was discovered.

68. **Thryothorus ludovicianus.** CAROLINA WREN.—Met with everywhere—on the pinnacle of the highest point in the State, over the slopes, and in the valleys. Very common. As often happens, nests were found in curious locations. One was situated in a little wooden box nailed to a tree by the wayside for the reception of the mail of the owner of a house a little back from the roadway. The site of another was a tin gallon measure placed, upright, on a high shelf in an open log out-building. The parents did not seemingly object to the measure being taken down and the young inspected. Well incubated eggs, June 23, 1887, and young just hatched, July 10, 1886, apparently signify that second broods are habitual.

69. **Thryothorus bewickii.** BEWICK'S WREN.—The only records I have are July 12, 1886, and June 19, 1889. On the former occasion an individual was seen, and on the latter an adult male taken. Both were in the Oolenoy Valley at the foot of Mt. Pinnacle.

70. **Sitta carolinensis.** WHITE-BREASTED NUTHATCH.—Haunting particularly the hardwood forests, it was common at all heights.

71. **Sitta pusilla.** BROWN-HEADED NUTHATCH.—This Nuthatch was tolerably common among the pines interspersed throughout the lesser eciduous growth, reaching upward, along the sterile ridges, to nearly or quite 2000 feet.

72. **Parus bicolor.** TUFTED TITMOUSE.—Abundantly and evenly dispersed over the wooded country, irrespective of elevation.

73. **Parus carolinensis.** CAROLINA CHICKADEE.—Like its congener, *P. bicolor*, of abundant and universal distribution. *P. atricapillus* was sought for in vain.

74. **Polioptila cærulea.** BLUE-GRAY GNATCATCHER.—Tolerably common in the valley of the Oolenoy. Not noted on the highlands.

75. **Turdus mustelinus.** WOOD THRUSH.—As the mountain region is approached, the Wood Thrush becomes more and more prominent, the cool hollows shaded by large oaks and other deciduous trees affording congenial residence. In the mountains, I found them most numerous from the mid-elevations upwards, but I think the local environment, more than the altitude, occasioned their abundance. So common were they that several performers were often heard at a time in a narrow area—even in the heat of midday. First young shot June 13.

76. **Sialia sialis.** BLUEBIRD.—Common. Owing to the nature of their haunts necessarily restricted in a large degree to the open lowlands. On Mt. Pinnacle occurred at about 3000 feet in a little chestnut 'deadening'—the only suitable nesting place near the summit.

A LIST OF BIRDS OBSERVED AT SANTAREM, BRAZIL.

BY CLARENCE B. RIKER.

With Annotations by Frank M. Chapman.

IN JULY, 1884, I visited Santarem, a town of 5000 inhabitants, situated on the Amazon at the mouth of the Tapajos River, 500 miles from the ocean. I made a second trip in June, 1887, and remained until the end of July. At this season the easterly trade winds blow constantly, tempering to a remarkable degree the intense heat of the tropical sun. The two seasons, the wet and the dry, are well defined; the dry period lasting from the middle of May until the middle of November with but occasional showers. The remainder of the year is characterized by almost constant rain.

During the dry season many forest trees shed their leaves, and the grass and small shrubs wither, while the palms and the majority of other trees bear their fruit; a noticeable exception, however, is the mango, the fruit of which matures in February. The physical conditions of the location are peculiarly adapted to a much diversified fauna. The city is located on a sandy bluff, back of which, and extending about five miles, is a sandy campos dotted here and there with clumps of bushes or small groves of stunted trees. Back of this again lies a belt of dense forest extending about three miles further to the edge of a table-land rising abruptly three hundred feet. This plateau extends to the southeast for thirty miles without a stream to give variety to the dense forest of giant trees. There are but few small ponds within this forest region, so far as it has been explored, and during the dry season these mud-holes swarm with an abundance of game. About these ponds, feeding upon the fruit of a palm found growing only there, is the only place where I have ever seen the great Blue Macaw (*Ara hyacinthina*). The plateau extends about 150 miles parallel with the Tapajos, and lying between it and the river is the campos district, which is alternated with palm swamps and a description of forest I have termed semi-palm, being a mingling of the hard wood trees and the palms. At various points spurs of the table-land rise abruptly from the river.

Diamantina, the settlement at which I was located, is eight miles from Santarem, and four miles from the Amazon. At the foot of the plateau, or 'mountain' as locally termed, an arm of the Amazon, called the Igarapi Mahica, runs within two miles of the settlement, and during the rainy season, expands into a vast lake embracing many square miles of palm forest.

Devoting most of my efforts to the mountain and semi-palm forest, spending but few days near the water, and but three days collecting on the campos, I can account for the absence in my collection of many species recorded by others as very common at Santarem; the bulk of most collections having been made about the campos and adjacent forest. The very striking contrast between the fauna of these belts is at once noticeable; the great number of birds which one would meet in a morning's outing showed that they were each inhabited by a characteristic group. The same contrast is manifest in the distribution of the lepidoptera, of which I also collected a series.

There are sugar-cane fields and clearings on the 'mountain' corresponding to those of the low lands, and offering all the attractions for the congregation of small birds, Flycatchers, Hawks, etc., yet the altitude of 300 feet and distance of less than a mile, seem a barrier over which many species never cross. Many species of Toucans and Parrots, and both *Cassicus* and *Ostinops*, are found commonly in both localities.

The abundance or scarcity of a large number of species I found subject to daily fluctuation, dependent upon the presence of the army ant or some fruit suddenly ripening, there being scarcely two consecutive days when birds could be found plentifully on the same feeding ground.

Tanagra palmarum, *Tanagra episcopus*, *Cassicus persicus*, *Ostinops decumanus*, and some species of Doves and Parrots, migrate morning and night to and from feeding grounds, in flocks, varying from a dozen of Parrots to thousands of *Cassicus*.

With but few exceptions birds were remarkably unsuspicious and easy of approach, but the density of the vegetation affords them excellent opportunities for concealment, and leads the collector too close for the successful use of the gun, it being a difficult matter to retreat to fair shooting distance without losing sight of the bird. I have seen a score of Parrots alight in a tree and, after searching in vain, have in despair risked a shot at a moving bough

There appeared to be very little difference in the comparative abundance of birds on my two visits; on either occasion one could take the field and in a very short time secure sufficient specimens to keep him busily employed in skinning for the rest of the day.

The abundance of stinging ants, each kind of tree seeming to be inhabited by a species of its own, lends to the efforts of an oölogist a spirit of vituperation not tending toward enthusiastic and careful research. Until an effectual protection has been discovered, against the fiery stings of these tree ants, it will require more to induce a lazy Brazilian Indian to climb a tree than an enthusiastic oölogist can provide. The only species found breeding were: *Arundinicola leucocephala*, *Brotogerys virescens*, *Busarellus nigricollis*, *Leptoptila erythrothorax*, two species of *Crypturus*, and several species of Flycatchers.

My collections, amounting in all to about four hundred specimens, I forwarded to Mr. Robert Ridgway for determination, the resulting new genera and species being described by him in the 'Proceedings of the United States National Museum' (Vol. IX, 1886, p. 523, and Vol. X, 1887, pp. 493-494, 516-528, and 545). Certain additional specimens were identified by Mr. J. A. Allen, and I have now to thank my friend Mr. Frank M. Chapman for arranging my notes and for adding such remarks to this paper as a further study of my specimens renders necessary.

[In order to make the list of Santarem birds as complete as possible I have included certain species not met with by Mr. Riker, but found by other collectors who have worked in the same field, giving in every case the authority on which these records are based. The sources from which these additional data have been procured are as follows: (1) 'A List of Birds collected by Charles Linden, near Santarem, Brazil,'* by J. A. Allen; (2) a small collection of birds made by Mr. Williams, who collected at Santarem from May to October, 1883. Mr. Williams is not now living, and it is to be regretted that his collections have become dispersed. A portion of them were purchased by Mr. J. M. Southwick of Providence, Rhode Island, from whom Mr. Riker secured a number of specimens, and a small mounted collection was presented by Mr. Williams's parents to the Museum

*Bulletin Essex Inst. VIII, 8, 1876, pp. 78-83.

of Brown University. Through the courtesy of Prof. J. W. P. Jenks, the curator in charge, I have been enabled to examine these specimens at the college, and I have also to thank Mr. Southwick for permission to make use of the specimens remaining in his private cabinet. The number of Mr. Williams's specimens which I have examined, therefore, is about one hundred and fifty. (3) A collection of some eight hundred birds, made from January to April, 1889, by Mr. William Smith, who was sent to Santarem to collect by Mr. Southwick. A representative series of two hundred specimens from this collection was purchased by the American Museum of Natural History, and I am permitted by the authorities of the Museum to include here the species contained in this collection which were not found at Santarem by Mr. Riker. It will thus be seen that the collections formed at Santarem represent the presence in the field of one collector for about twelve months covering the period from January to October. In making these additions I have endeavored to preserve the strictly local character of this list, admitting no species which have not been found in the immediate vicinity of Santarem. This will, I think, give to the paper a peculiar value as indicating the avifauna of one limited locality, a character wanting in the majority of South American lists which, as a rule, present the results of observations over a more or less extended area.

Mr. Riker's experience is in the highest degree instructive; on his first trip, having little or no knowledge of South American birds or their ways, he collected without definite object and with only moderate success, securing one specimen of a species new to science. Possessed now of some experience and a knowledge of what were desirable birds and the most likely to prove new or interesting, he returned to Santarem and, collecting at practically the same season, procured fifteen species new to science of which two were the types of new genera. This comparison of results is suggestive, and illustrates the difference between indiscriminate collecting and well directed effort; how many other localities which we now suppose to have been more or less thoroughly explored, will prove on more careful and skilful investigation to be as fertile in novelties as Santarem has been, it is, of course, impossible to say.

Influenced by more recent discoveries, or additional material, I have in a number of instances revised the determination of the

species herein included, and should, therefore, be held responsible for the nomenclature as it now appears. For convenience the arrangement of Sclater and Salvin's 'Nomenclator' is followed, and with certain exceptions the nomenclature there employed is adopted.—F. M. C.]

1. **Merula fumigata** (*Licht.*). — Common in semi-palm growths; frequently observed flying low along the forest paths; making short flights and re-alighting before you.

[Three specimens are apparently typical of this species and agree closely with Maximilian's types of *Turdus ferrugineus*. Two individuals show a marked variation in size. A male taken June 25, 1887, measuring, wing, 4.29; tail, 3.48; tarsus, 1.21; exposed culmen. .78; while a female, taken July 1, 1887, measures, wing, 4.72; tail, 3.80; tarsus, 1.20; exposed culmen, .82 inch.—F. M. C.]

2. **Mimus saturninus** (*Licht.*).—A female, captured August 11, 1887, in a semi-palm thicket was the only one observed.

[This specimen measures (skin), length, 9.00; wing, 3.96; tail, 4.18; tarsus, 1.22; gonys, .41 inch; (mandible broken). It is evidently similar to the bird from Para on which Lichtenstein based his description of *Turdus saturninus*. Specimens from Bahia, to which the name *saturninus* has generally, but I believe wrongly, been given, differ greatly from the Santarem bird both in size and coloration. An example from Dr. Lacerda measures (skin), length, 11.00; wing, 4.38; tail, 5.10; tarsus, 1.40; exposed culmen, .82; gonys, .51 inch. It is much browner above and more buffy below than the Santarem bird. Lichtenstein gives the length of his Para bird as 9 inches, and says, "Cauda brevior quam in T. polyglotto." His description of "*T. polyglottos* Lin.," number 445 on the same page of the 'Verzeichniss' as the original description of *saturninus*, with the habitat given as "Am. sept.," enables us to recognize the bird with which he made his comparison as undoubtedly the *Mimus polyglottos* of recent authors. In this species the tail averages about 5 inches; longer, therefore, than in the Santarem bird, which thus agrees with Lichtenstein's type, but shorter than in the bird from Bahia. Aside from geographical reasons it is evident, therefore, that the name *saturninus* belongs to the Lower Amazonian bird and is not applicable to the bird from Bahia, which, being thus left without a name and being evidently worthy of recognition as a distinct species, may be called

Mimus arenaceus, sp. nov.

SP. CHARS.—Similar to *Mimus saturninus* (Licht.) but larger and much browner above, the feathers of the rump sandy brownish without darker centres, the underparts with a suffusion of buffy which is heavier posteriorly.

Description.—Type, No. 39,274, Am. Mus. Nat. Hist., Bahia, Brazil.

Lacerda, in fresh and unworn plumage. Above grayish brown, the feathers of the head with distinct, those of the back with obscure, darker centres; rump sandy brownish, the feathers without darker centres; wings fuscous-brown, the primaries and outer secondaries with their greater coverts edged with whitish, the inner secondaries and tertiaries terminated with whitish and edged with the color of the rump; lesser coverts with brownish white borders which are whiter terminally; tail somewhat darker than the wings, all but the outer pair of feathers margined externally with grayish brown, the outer feathers externally margined from near their bases with whitish and terminated by a white band which measures on their shafts 1.25 inches and decreases in width on the succeeding feathers until it appears merely as a slight apical tip on the pair next the median feathers on which it is entirely wanting; there are faint blackish moustachial streaks, and a blackish line from the corner of the mouth passes through the eye, includes the upper half of the auriculars, and is bordered above by a buffy white loral line which widens posteriorly into a broader, slightly whiter postocular stripe; the underparts are buffy whitish, slightly grayer on the breast, the buffy suffusion growing heavier posteriorly and appearing as fulvous on the crissum; under wing coverts pale, clear, creamy buff; flanks buffy brown, heavily streaked with blackish; bill black, the maxilla lighter basally; feet black, the soles yellowish.

In southeastern Brazil and south to the Argentine Republic, *Mimus arenaceus* is evidently replaced by *modulator* of Gould, with which it may intergrade. So far, as my material goes, however, the two birds are distinct.

From true *saturninus*, *arenaceus* may be distinguished (1) by its larger size, (2) by the browner coloration of the upper surface, the feathers here having less distinct blackish centres, (3) by the presence of a buffy suffusion occupying to a greater or less extent all the white areas, and (4) by the yellow instead of plumbeous color of the soles of the feet.

Although Mr. Allen, in his 'List of Birds collected at Santarem by Charles Linden,' records *saturninus* as "common," Mr. Riker met with only a single specimen and it was not taken by Mr. Smith. Mr. Layard, in his list of birds observed at Para,† does not mention it, nor does Dr. Sclater give it in his list of the birds collected by Wallace on the Lower Amazon.‡ It is apparently not common in collections and I append therefore, a description of Mr. Riker's specimen.

Mimus saturninus (*Licht.*).

Coll. C. B. Riker, ♀, August 11, 1884, Santarem (Diamantina,)

†Ibis, 1873, p. 374. ‡P. Z. S., 1867, p. 566.

Brazil. Plumage slightly worn. Above blackish brown, the feathers of the head with brownish, those of the back with grayish, margins; rump grayish brown, the feathers with darker centres; wings brownish black, the primaries edged with pure white, the first three with slight terminal white margins; outer secondaries with a narrower whitish margin, inner secondaries and tertiaries edged with brownish and tipped with whitish; exposed portion of the primary coverts with a broad margin of pure white, the lesser and greater coverts tipped with brownish white which is whiter terminally; tail somewhat browner than the wings, all but the outer feathers with slightly lighter external margins, the outer feathers from near their bases margined externally with white and terminated by a white band which measures 1.00 inch on their shafts, and is about the same width on the inner web of the next two feathers; on the fourth it is of less extent, on the fifth appears as a brownish white border, and is wanting entirely on the median pair of feathers; a moustachial streak is barely evident and a blackish line passing through the eye includes the upper half of the auriculars and is bordered above by a buffy loral and grayish postocular stripe; the underparts are grayish white, deeper on the breast; crissum fulvous; under wing-coverts whitish with a slight buffy tint, the flanks buffy brownish, lighter than in *arenaceus*, and heavily streaked with blackish; bill black, the maxilla lighter basally; feet blackish, the soles dull plumbeous.—F. M. C.]

3. **Donacobius atricapillus** (*Linn.*).—July 7, 1887, male; June 27, 1887, female.

[4. **Campylorhynchus hypostictus** *Gould.*—Two specimens (Smith) February 6, and March 11, 1889, agree very closely with a specimen of *hypostictus* from Bogota, but are somewhat more heavily marked below, being, therefore, easily distinguishable from *variegatus* from Bahia.—F. M. C.]

5. **Cyphorinus griseolateralis** *Ridgw.*

Cyphorinus griseolateralis RIDGW., Proc., U. S. Nat. Mus., X, 1887, p. 518.

Two specimens taken July 10, 1887, amongst the debris of a fallen tree on the 'mountain,' and there were apparently several others. Their notes are more flute-like than those of any bird I have ever heard, varying from a high to a low note in a beautiful rippling song. Called by my guides, when first we heard it, the 'flute-bird,' and to it they attach a superstitious legend.

[The discovery of this species extends the range of the genus from the Upper to the Lower Amazon, where it evidently represents the Ecuadorian *Cyphorinus salvini* Sharpe.—F. M. C.]

(*To be continued.*)

THE HORNED LARKS OF NORTH AMERICA.

BY JONATHAN DWIGHT, JR.

SINCE Mr. Henshaw's review of this group six years ago (Auk, Vol. I, 1884, p. 254) his collection of birds has passed into the British Museum, and much of his valuable material has not been available for study in the present connection, but the loss of this has been more than compensated by the immense number of specimens kindly placed at my disposal by many members of the American Ornithologists' Union. Over 1200 were sent to the last meeting of the A. O. U., by request of the Committee of Arrangements, and since then I have examined many others, bringing the grand total up to 2012. Such a magnificent series of birds of one species has probably never before been brought together, and including, as it does, birds from all portions of the continent and at all seasons of the year, it affords a wonderful opportunity for the study of plumage and geographical variation, and at the same time brings one face to face with the question, as yet unsolved, of a nomenclature that, without being cumbrous, will fit the many groups, intergrading one with another, into which the North American genus *Otocoris* is certainly separable. Binomialism, based on the fixity of species, will not suit the Horned Larks, for from the Atlantic to the Pacific, and from the Arctic down into Mexico, I can form a chain of differing groups that, nevertheless, pass insensibly from one to the other, absolutely without break. Trinomialism gives relief, but it does not provide for exactly intermediate specimens, nor does it formulate a rule under which subspecies may be established, but leaves the matter to the varying taste of every student. However, it is not my purpose to discuss nomenclature, and I trust the conclusions I have reached will be sufficiently conservative to meet with the approval of those who have had to deal with the same difficulties.

Accepting trinomialism as it is today, I have applied the following rule to my study of the Horned Larks, *i. e.*, to recognize as races groups of birds that during the breeding season occupy definable areas over which similar conditions of climate and vegetation prevail, and that show differences of size or plumage at the centres of such areas, which may be readily recognized and

clearly described. This brings it down to a question of where to draw the circumscribing lines, and allowing the already described forms to stand as models, I have endeavored to draw them no closer than those laid down by Mr. Henshaw. The excellence of his work, based on 350 specimens, is attested by the fact that my material does little more than support his conclusions, and where I have arrived at different results, it is simply because I have specimens that were not then obtained. In fact I have had too many from certain localities, not enough from others. Breeding examples of the Arctic forms *alpestris* and *leucolæma* are few in number, and as for Mexico, there is next to nothing to show what real *chrysolæma* is. Mr. Henshaw's material only carried him as far south as Arizona and New Mexico, and he naturally supposed that *arenicola* passed into *chrysolæma*, there being nothing to show the existence of the well-marked desert race *adusta* which intervenes. The naming of such intermediate races as *adusta* and the dark race *merrilli* of eastern Oregon, Washington and British Columbia, the only new ones except *pallida* recognized in this paper, may be questionable, but they certainly are as well marked as already existing forms, and as matters stood *arenicola* was an intermediate race between *leucolæma* and *chrysolæma*, north and south, and between *praticola* and *strigata*, east and west. Among the surprises developed by the material before me, is the existence of a form on the eastern slope of the Sierra Nevada Mountains, referable directly to *praticola*. This is discussed under its proper head, and I now wish to call particular attention to two facts which seem to have escaped general notice, and are of great importance in understanding the plumage of birds of this genus. One is the fact that but one moult takes place in the year, the breeding plumage being the result of the wearing away of the tips of all the feathers acquired during the autumn moult. The effect is most striking on the black areas which, clouded and obscured with yellowish tips in the autumn, come out clear and defined in the spring. There is no evidence whatsoever of a spring moult. The other is that young birds in passing from first plumage, which is worn only a few weeks, moult wings and tail as well as the feathers, usually moulted. This fact and change of plumage without moult have not been attributed to the Horned Larks, so far as I know, and only in a general way is it known to be true of other species.

I have endeavored to prepare a key, but where differences are so slight that now and then the individual variation will amount to as much as the varietal, it is almost impossible to formulate descriptions of colors of which no two persons have the same idea. Ridgway's 'Nomenclature of Colors' has been my guide, and typical specimens have been directly compared with the plates of colors in this work. The birds measured have been principally those breeding at points where the races should be typical. The wing measurements of fully three quarters of the series have been roughly taken, and those that were strikingly large or small have received more careful consideration in making comparison with those of normal size and color. Those that were much worn I have endeavored to throw aside, but in some cases they are responsible for the apparently great variation of extremes.

It is not my purpose to treat the subject exhaustively, but merely to contribute to what we already know, the results obtained from a good many weeks' study upon the unexampled series before me. The facts of distribution are graphically represented on the accompanying map. Laboring as I have under the disadvantage of not having visited many of the areas, the study of topography and altitudes, of charts of rain-fall and forest distribution, and of the literature bearing upon the subject, has been imperative in properly understanding the relation of one race to another, and the map embodies my conclusions. The area over which each race may be expected to occur in the breeding season is indicated, the lines approaching closely where the material justifies it, and where it does not I have thought it best to leave considerable intermediate space. The greater the amount of the material studied, the closer together can these lines of arbitrary demarcation be drawn, my object being to include within them breeding birds that differ less from one another than they do from those of an adjacent area. Of course we must not expect to find Horned Larks everywhere, but only over such portions of a given area as are suitable to the birds' taste. To exactly map distribution will be a work of the future, and I hope my contribution to our knowledge of the genus *Otocoris* is only a beginning, and outlines what we may expect to see better done with every species when a sufficient amount of material is gathered. Even that at hand does not suffice to show winter distribution accurately. All the races show a greater or less southward movement at this sea-

son, overlapping and extending their ranges in a very puzzling manner. I am inclined to the belief that the mountain races usually descend to the lower plains, and besides are often urged southward by severity of weather or lack of food supply. *Leucolæma* and *alpestris* appear to leave entirely their summer haunts; *praticola*, and *arenicola* move south over only a part of their summer range; *giraudi*, *rubea* and *strigata* appear to be chiefly resident; and material is still wanting to determine the range of the other forms.

The yellowing and darkening effect of age upon some of the older skins, especially of young birds, is an element of danger to the student of limited series, and is well illustrated by some young *arenicola* which might be easily mistaken for *praticola*, were it not for later material from the same spot.

To all those fellow members of the A. O. U. who have placed material at my disposal my thanks are hereby extended, especially to Mr. Robert Ridgway for the loan of type specimens, to Mr. Wm. Brewster for specimens of *merrilli* and *adusta*, and to Mr. J. A. Allen who has aided me with suggestions and advice.

1. Otocoris alpestris (*Linn.*). Horned Lark.

Habitat. — Northern Europe, Greenland, Newfoundland, Labrador, and Hudson's Bay region; southward in winter into eastern United States to about Lat. 35°.

The Horned Lark of northeastern North America is characterized at all seasons by its large size, dark colors and yellow eyebrows. The nape, shoulders, and rump are of a pink-vinaceous cinnamon; the white below, dull. In autumn it appears darker and less obviously streaked above, owing to the longer, grayish or pinkish edging and tips of the feathers; the black of the head is much obscured by buffy or yellowish tips, that of the breast less so; the yellow is much brighter, occasionally showing faintly below the jugular crescent, and often suffusing the whole of the upper parts, particularly the head. Young of the year are browner and more spotted, but cannot be distinguished with certainty from the adults. The amount and intensity of the yellow is purely individual, and independent of age, sex or season, but in this bird alone of the group it is always present.

Mr. Henshaw's conclusion that the European bird is identical with ours must stand, unless a good series should prove the contrary. I have seen but two specimens, and can infer nothing from them. They agree in size with our birds; one, a male in autumn plumage from Sweden, is more lilaceous, and that is all the difference observable. Our bird breeds far north of the United States, about the shores of Hudson's Bay, Labrador and Newfoundland, and in winter is found chiefly along the coast of the New England and Middle States, abundant to about Lat. 38°. West of the Appalachian mountain chain it is perhaps less abundant, though occurring, as shown by typical specimens, as far west as Manitoba. A few breeding birds from the Saskatchewan region and winter specimens from the Mississippi Valley, evidently bred in this intermediate region, are better referable to *leucolæma*, though dark and slightly tinged with yellow on the throat.

Average measurements of 11 breeding males: wing, 108.5 mm. (4.27 in.); tail, 72.1 mm. (2.84 in.); tarsus, 23.1 mm. (.91 in.); bill from nostril, 10.2 mm. (.40 in.).

Specimens examined: ♂, 328; ♀, 221; young in first plumage, 6. Localities represented: Sweden, Europe; *Ft. Chimo and *Davis Inlet, Labrador; *Penguin, Is., *Cape St. Mary, and *Canada Bay, Newfoundland; *Moose Fort, Hudson's Bay region; Hampton, N. H.; Ipswich, Revere, Chelsea, Watertown, Newtonville, Duxbury, Chatham, and North Truro, Mass.; Connecticut; Long Island (King's, Queen's, and Suffolk Cos.), Troy and Lockport, N. Y.; Haddonfield, N. J.; Bucks Co., Philadelphia, Carlisle, and Erie, Pa.; Delaware; Washington, D. C.; Raleigh, N. C.; Cleveland and Circleville, O.; Toronto and Rat Portage, Ontario; Ypsilanti, Mich.; Manitoba; Ft. Snelling, Minn.; Mt. Carmel, Ill.; and New Orleans, La.

2. Otocoris alpestris leucolæma (*Coues*). PALLID HORNED LARK.

Habitat.—Alaska and western British America; southward in winter into Western United States to about Lat. 40°.

This appears to be the largest form of all, and when typical shows no yellow. The back is very gray, and the nape, etc., are vinaceous or pinkish vinaceous in the males.

A few breeding birds from the Saskatchewan and Great Slave

*An asterisk denotes breeding birds.

Lake region, though tinged with yellow on the chin, are, on account of size and colors somewhat paler than *alpestris*, referable to *leucolæma;* so too are large dark birds with white eyebrows and pale yellow chins found in winter in the upper Mississippi Valley, coming as they doubtless do from an intermediate region between Hudson's Bay and Alaska. Breeding birds of these two races are few and limited mainly to those taken on Government expeditions; consequently I do not draw the lines on the map as closely together as with some of the other races better defined.

Two young in first plumage taken on the Arctic Coast east of the Anderson River may be referred to this race. While they are not as black and white as might be expected in Alaskan birds, they lack the general yellowishness of young *alpestris* from Newfoundland. In winter *leucolæma* is found as far south as the middle of the western United States, mostly east of the Sierra Nevada Mountains. Northwest coast specimens indicate that a small-sized *leucolæma* may breed in the mountains not far north of the United States boundary, though such birds may generally be referred to *merrilli*. A male in autumn plumage taken Aug. 26, at Chief Mt. Lake on our northern boundary, Long. 114° W., suggests the possibility of this form breeding also on the mountains at that point or not far to the north of it. It is not reported from Pt. Barrow, is rare at St. Michaels, Alaska, and is probably an interior race. A winter example from Long Island, N. Y., shows how far it may stray at that season, though this bird is hardly typical.

Average measurements of 9 breeding males: wing, 111.8 mm. (4.40 in.); tail, 74.7 mm. (2.94 in.); tarsus, 22.4 mm. (.88 in.); bill from nostril, 9.9 mm. (.39 in.).

Specimens examined: ♂, 38; ♀, 24; young in first plumage, 2. Localities represented: *Ft. Youkon and *St. Michaels, Alaska; *Arctic coast east of Ft. Anderson, *Harton River, and *Franklin Bay; *Ft. Reliance, *Ft. Resolution, and *Big Island (Great Slave Lake), Northwest Territory; *Saskatchewan region; Chilliwask, B. C.; Walla Walla, Wash.; Ft. Klamath, Ore.; Carson and Steamboat Valley, Nev.; Camp Floyd, Salt Lake City, and Ogden, Utah; Bitter Root Valley, Sun River, and Chief Mountain Lake, Mont.; La Rivière Lac, Souris River, N. Dak.; Ft. Randall and Vermillion, S. Dak.; Coyote Sta., Emporia, Ft. Riley, and Manhattan, Kan.; and Shelter Island (Long Island), N. Y.

3. Otocoris alpestris praticola *Hensh.* PRAIRIE HORNED LARK.

Habitat. — Upper Mississippi Valley and region of theGreat Lakes.

This bird is a miniature *leucolæma*, somewhat darker, and with a pale yellow chin which is seldom bright, and is often white. Autumn birds seem to show more linear spots on the breast than do the other forms, but this is not a constant feature. It seems to have gradually extended its range eastward as the woods have disappeared, and we can see why it should be nearer to *leucolæma* than to *alpestris*. It has recently been found breeding in Vermont and on Long Island, and either of these localities is a long distance from Hudson's Bay or Newfoundland, and mountains intervene. However, as we go westward we find a direct gradation into *arenicola*, and this race passes directly into *leucolæma*. Now *leucolaema* passes into *alpestris* and somewhere in the Saskatchewan or Winnipeg regions we shall find, I venture to say, breeding birds that might be referred to any one of these four forms. It is birds that have wandered southward from such a point as this that are most difficult to determine, even with abundant material at hand for comparison. In winter *praticola* visits South Carolina and central Texas, though it seems to be largely resident throughout its range and at its northeastern limit in New York is a very early breeder. There are no records of its breeding south of southern Illinois, Missouri, and Kansas, and its western range practically coincides with the line where prairie ceases and plains begin, which is also nearly coincident with the north and south line of twenty inches annual rain-fall, passing through central Manitoba, Dakota, Nebraska and Kansas.

Strange as it may seem, it is a fact that several breeding birds from Carson, Nevada, must be considered of this race. Typical *arenicola* of the arid, elevated region of the Plains and Great Basin grades off to the eastward into *praticola*, a bird of moist, grassy regions, and to the westward into the Carson *praticola*, a bird of the eastern slopes of the Sierras, which are known to have about the same rain-fall as the prairies. The mountains form a barrier to the westward, and there is no intergradation with *rubea*, the race just across them in California. This, fortunately, perhaps, prevents further complication and we may call it a case of

interrupted distribution or consider the bird a dark *arenicola*, but the fact remains that birds breed at Carson which cannot be distinguished from those that breed in New York State. A couple of winter birds from the Mojave Desert might be referred to this form, but are as pale as typical *arenicola*.

Average measurements of 30 breeding males: wing, 103.6 mm. (4.08 in.); tail, 72.6 mm. (2.86 in.); tarsus, 21.1 mm. (.83 in.); bill from nostril, 9.4 mm. (.37 in.).

Specimens examined: ♂, 159; ♀, 72; young in first plumage, 30. Localities represented: North Truro, Hyannis, and Revere, Mass.; *Long Island City, *Troy, *Alder Creek, *Syracuse, *Peterboro, *Geneva, and *Lockport, N. Y.; *Erie and Philadelphia, Pa.; Washington, D. C.; Arlington, Va.; Raleigh and Weaverville, N. C.; Circleville, O.; Indianapolis, Ind.; *Mt. Carmel, *Richland Co., Adams Co., Mason Co., *Sugar Creek Prairie, *Waukegan, *Calumet, *Riverdale, *W. Northfield, and *Evanston, Ill.; Ann Arbor and *Cadillac, Mich.; Racine and *Dane Co., Wis.; *Toronto, *Peel Co., and Rat Portage, Ontario; *Carberry, Manitoba; *Pembina, N. Dak.; Ft. Snelling, Tintah, and Zumbrota, Minn.; *Lake Mills and *Grinnell, Ia.; London and Papillion, Neb.; *Turkey Creek, *Leavenworth, *Topeka, Manhattan, and *Big Blue River, Kan.; *Missouri; Gainesville, Dallas, and Giddings, Tex.; *Carson and *Franktown, Nev.

4. Otocoris alpestris giraudi *Hensh.* TEXAN HORNED LARK.

Habitat. — Coast region of southern Texas.

Small size and the peculiar light gray of the back distinguish this form at all seasons. There is a yellowish green tinge above in autumn, and at all seasons the yellow of the head is very deep, extending on the breast below the black crescent in a large majority of the males. Without being pallid like *arenicola*, it is strikingly pale, and does not resemble any other race so closely as *leucolæma*. Its peculiarities of coloration, its size, and its isolated breeding range, which seems to be several hundred miles from the nearest forms (towards which it shows no variation), give it strong claims for specific rank, but while material from the intermediate area is lacking, such a course might be premature.

Average measurements of 15 breeding males: wing, 97.3 mm. (3.83 in.); tail, 65.0 mm. (2.56 in.); tarsus, 21.6 mm. (.85 in.); bill from nostril, 9.1 mm. (.36 in).

Specimens examined: ♂, 31; ♀, 19; young in first plumage, 5. Localities represented: *Brazoria Co., *Wharton Co., *Aransas, Bee Co., *Corpus Christi, and Pt. Isabel Texas,.

5. Otocoris alpestris arenicola *Hensh.* DESERT HORNED LARK.

Habitat.— Region of the Great Plains, Rocky Mts., and the Great Basin of the United States, from the northern boundary to about Lat. 34°.

General paleness combined with whiteness below mark this race, distinguishing it from *praticola;* size and yellow chin separate it from *leucolæma;* the back is pale, and the nape vinaceous-pink. The yellow is, however, as in the other races, exceedingly variable, independent, I have already said, of age, sex, or season, and may vary from almost white to bright lemon. Still on an average it is brighter in autumn than in summer, and palest in northern breeding birds. Colorado breeding birds differ very little from those of the plains of Montana at lower altitude, but Dakota and Kansas specimens approach *praticola*. Those of the mountains of western Montana approach close to *merrilli*, are darker on the back, and in autumn more suffused with yellow. Specimens of this sort are found at Carson in winter. Birds from the desert region of Utah, near Great Salt Lake, are paler with a reddish cast of plumage similar to specimens from northern New Mexico, Arizona and Western Texas, which are still redder and a little smaller, with yellower throats. Most of these last are the intermediates between *arenicola* and *adusta*, and referable to the latter. Material at hand, particularly young birds, indicates that the birds of the higher portions of Arizona and New Mexico, notably San Francisco Mt., Ft. Verde, Lone Mt. and Albuquerque, are better referable to *arenicola*. Where mountains, forest, and desert are so mixed together that in a few miles one may find all these modifying causes it is not surprising that the birds should prove puzzling.

I have referred the mountain bird of Carson to *praticola*. Probably *arenicola* is the form of the arid region at the foot of the mountains, but there is no material from the Great Basin between Carson and Great Salt Lake to prove this. Winter birds from the Mojave Desert, though small, are referable to this

race, and a Ft. Tejon, Cala., specimen seems to be a connecting link between *chrysolæma* and *arenicola*. The young of this race and the young of *praticola* differ much more than do the adults, *praticola* being very dark brown and *arenicola* very light.

In winter *arenicola* ranges south into Texas and Mexico, though it is probable that many of the birds merely descend from the mountains to the neighboring plains. How far north *arenicola* extends is uncertain. It may be called the form of the Rocky Mountains and adjacent plains, and while it embraces birds of mountain, plain, and desert, the differences between them are so unimportant, as shown by the immense series before me, that I am convinced, unless we go into veritable 'hair-splitting,' one name should stand for all. Local causes, such as latitude, rainfall, and altitude, modify somewhat the average characters of this race, birds breeding on the mountains being slightly larger and paler than those of the lower plains, and the same thing holds true of northern breeding birds as compared with those from its southern limit, but considering the great diversity of the large area over which it is found, the differences are surprisingly small and do not appear to be much greater than the individual differences observable in large series from single localities.

Average measurements of 20 breeding males: wing, 104.4 mm. (4.11 in.); tail, 72.1 mm. (2.84 in.); tarsus, 21.3 mm. (.84 in.); bill from nostril, 9.7 mm. (.38 in.).

Specimens examined: ♂, 395; ♀, 206; young, first plumage, 73. Localities represented: *Heart River, *Fort Union, Ft. Rice, and Dickinson, N. Dak.; *Buffalo Gap, Ft. Tyndall, and Ft. Randall, S. Dak.; *Ft. Keogh, Ft. Custer, Frenchman's River, Porcupine River, Two Forks of Milk River, Sunday Creek, Three Buttes, Dry Horse Creek, *Helena, *Moreland, *Pass Creek, Dry Creek, *Willow Creek, Madison River, Gallatin River, *Hillsdale, and *Rainbow Falls, Mont.; *Ft. Fetterman, Bridger, Laramie and Cheyenne, Wyo.; *Denver, Ft. Massachusetts, Clear Creek. *Colorado Springs, Pueblo, *Fair Play, Central City and *South Platte, Col.; Washoe Lake and Carson, Nev.; Salt Lake City, Santa Clara, Ogden, Beaver, Fairfield, and Kelton, U.; Mojave Desert, Cala.; Wilcox, Ft. Verde and San Francisco Mountain, Ariz.; Zuñi, Santa Fé, Chico Springs, Silver City, Lone Mountain, Mimbres to Rio Grande, Las Vegas, Deming, Ft. Thorn, and Ft. Bayard, N. M.; Chihuahua, Mexico; San Angelo, Concho Co., Comanche, Cook Co., Kendall Co., Giddings, *Pecos City, Ft. Davis, Sierra Blanca, Marfa, Del Rio, and Laredo, Tex.; Beaver River, Tepee Creek and Ft. Reno, I. T.; Garden City and *Ft. Hays, Kan.; and *Valentine, Neb.

6. **Otocoris alpestris adusta**, subsp. nov. SCORCHED HORNED LARK.

Habitat.—Southern Arizona and New Mexico, Western Texas, and southward into Mexico.

SUBSP. CHAR:—Similar to *chrysolæma*, but of a uniform scorched pink or vinaceous-cinnamon above.

Adult male in breeding plumage (No. 23,575, Coll. Wm. Brewster, Feb. 21, 1887, Camp Huachuca, Arizona): Above uniform vinaceous-cinnamon, in no contrast to slightly pinker nape, and extending on sides and flanks; fore part of head, 'horns,' loral stripe, and jugular crescent, uniform black; chin canary-yellow; forehead, supercilliary stripe, and posterior ear-coverts white, tinged with canary; rest of lower parts creamy white, reddish-tinged; wings reddish brown, quills whitish-edged. Feet black; bill plumbeous black, lower mandible bluish towards base. Wing, 101.6 mm. (4.00 in.); tail, 71.9 mm. (2.83 in.); tarsus, 20.3 mm. (.80 in.); bill from nostril, 9.1 mm. (.36 in.).

Adult male in autumn plumage (No 23,555, Coll. Wm. Brewster, Sept. 28, 1888, Chihuahua, Mexico,): Above darker and more scorched or rusty than in spring; black areas clouded, and plumage generally softer, otherwise as in spring.

Adult female in breeding plumage (No. 23,588, Coll. Wm. Brewster, March 2, 1887, Camp Huachuca, Arizona): Above reddish cinnamon, streaked continuously from bill to rump-band with darker reddish brown; no crown patch; loral stripe faintly indicated with dusky; jugular patch restricted; otherwise like the male. Wing, 94.7 mm. (3.73 in.); tail, 63.0 mm. (2.48 in.); tarsus, 19.8 mm. (.78 in.); bill from nostril, 8.6 mm. (.34 in.).

Young, first plumage (No. 116,918, U. S. Nat. Mus., Sulphur Spring, Arizona, Aug. 18, 1874). Above pale reddish cinnamon, dotted on head, neck, and back with small buffy spots, tipping feathers that are dark brown subterminally; wings similar, quills edged with reddish cinnamon; underparts white, spotted lightly across the throat with dusky upon a buffy band. Tail deep brown, outer feathers tipped and edged with reddish cinnamon. This bird is very young, the tail not one third grown. As compared with the young of other races, it is almost identical in appearance with *chrysolæma* from Nicasio, California, but the prevailing reddish tints render it easily separable from all the other forms except *chrysolæma* and *rubea* of which the series of young is a meagre one, and the constant characters open to some doubt.

The uniform pale vinaceous-cinnamon above, which tinges the creamy white of the lower parts, renders this bird almost unmistakable. It presents a scorched appearance, the brown more pronounced in autumn.

It may seem questionable to describe a race that is intermediate in characters and habitat between others already known, but, as I have said before, several of the existing races grade into two or three others, and if we admit them we must also recognize others quite as well marked. ***Adusta***, I venture to say, is as conspicuous as any, and shows the extreme effect of sun and desert in paling and reddening a bird that otherwise would be a small ***arenicola***.

It extends but a short distance north of our Mexican boundary, and is found in winter at Chihuahua, but from lack of material we can only surmise that it will be found in the desert plateau region of Mexico south of our border line, passing into true ***chrysolæma*** in the fertile valleys to the south. The most characteristic birds come from Camp Huachuca, Arizona, in the spring, but I have others from Ft. Yuma, the Santa Rita Mountains, and Ft. Verde, that are nearer to this form than to ***arenicola***. Western Texas birds seem to be larger and much like Great Salt Lake specimens, but all birds from desert regions in Nevada, Utah, Arizona, New Mexico and western Texas, are paler and redder-tinged than those that are found in the mountains, so that the length of wing and intensity of yellow on the chin must also be factors in determining whether they should be referred to this race or to ***arenicola***.

Average measurements of 20 breeding males: wing, 102.9 mm. (4.05 in.); tail, 71.4 mm. (2.81 in.); tarsus, 20.8 mm. (.82 in.); bill from nostril, 9.4 mm. (.37 in.).

Specimens examined: ♂, 51; ♀, 30; young in first plumage, 11. Localities represented: Chihuahua, Mexico; *Camp Huachuca, *Santa Rita Mts., *Ft. Verde, *San Francisco Mt., *Oracle, *Willow Spring, *Sulphur Spring, and *Rio Perro, Ariz.; *Ft. Wingate, Zuñi, *Santa Fé,* Albuquerque, and *Lone Mt., N. M.; and *Ft. Davis, *Pecos City, Laredo, and Giddings, Tex.

7. **Otocoris alpestris chrysolæma** (*Wagl.*). MEXICAN HORNED LARK.

Habitat.—Mexico, northward along the coast of California to about Lat. 38°.

In this race the contrast between the color of the nape and that of the back is sharp even in autumn, and typically it is a pink cinnamon-rufous contrasting with a sepia-brown back. Autumn specimens are darker, often quite yellowish, and the yellow of the throat is a variable quantity, usually bright. The white below is

clear and rather creamy at all seasons. This race also often has the feathers of the 'knee' yellow.

Although the Mexican material is limited to a few specimens, it suffices to show that while birds from Vera Cruz and the Valley of Mexico average a little larger and perhaps yellower-throated than those from San Francisco, all may be included in the same race. Breeding birds from southern California are often indistinguishable even in size from Mexican examples, and although San Francisco birds are redder and sometimes identical with true *rubea*, the majority are more like Mexican specimens than they are like *rubea*.

The habitat assigned admits *chrysolæma* to California in a narrow belt west of the Coast Range Mountains. Although *adusta* and *pallida* practically cut the habitat of *chrysolæma* in two, material at hand does not show that the Mexican bird is separable. Mr. Henshaw thought the California birds were all *rubea*, and referred Audubon's supposed type of *Alauda rufa* to this form. I have examined it, and refer it to *chrysolæma*, restricting *rubea* to the Sacramento Valley. What may occur in the San Joaquin Valley remains to be proved. A Ft. Tejon specimen is very faded and approaches *arenicola*, as already noted. A winter specimen from Bogotá (described by Sclater as a new species, *peregrina*) is very small, but does not differ appreciably otherwise.

Average measurements of 30 breeding males: wing, 99.3 mm. (3.91); tail, 68.3 mm. (2.69); tarsus, 20.8 mm. (.82); bill from nostril, 9.4 mm. (.37 in.).

Specimens examined: ♂, 90; ♀, 36; young in first plumage, 3. Localities represented: [Bogotá, U. S. of Columbia]?; *Valley of Mexico and *Mirador (near Vera Cruz), Mexico; *San Quentin, Lower Cala.; San Diego, Elsinore, San Gorgonio Pass, Riverside, *Los Angeles, Pasadena, *Alhambra, Ventura Co., *Santa Barbara, San Simeon, Los Gatos, San José, San Francisco, *Oakland, *Haywards, *Altamont, Stockton, *Nicasio, and *Sonoma Co., California.

8. **Otocoris alpestris rubea** *Hensh.* RUDDY HORNED LARK.

Habitat.—Sacramento Valley, California.

Bright rufous suffusing the whole plumage and merging into the ruddy brown of the back without abrupt change, distinguishes this race from *chrysolæma*. It averages a very little smaller, and as it is restricted to a small area the geographical variation is slight. Cut off by high mountains from adjacent races north and

east, it does not seem to partake of their characters, and 'intergrades' are few. Though the material at hand only proves that it inhabits the Sacramento Valley between the Sierras and the Coast Range, it is probable that it will be found in the San Joaquin Valley along the western slope of the Sierras as far south as the same conditions of rainfall and similarity of country prevail. It seems to be largely resident. Mr. Henshaw described as his female type of this race (Auk, 1884, p. 267) the female from Santa Rosalia Bay (No. 82,413, U. S. Nat. Mus.) that Mr. Townsend has now referred to *pallida*. It certainly is not *rubea*, and strange to say bears no type label, while No. 83,968 from Placer Co., Cala., is labelled as a type and is a typical female. For the sake of accuracy I call attention to this hitherto unexplained changing of labels.

Average measurements of 13 breeding males: wing, 99.6 mm. (3.92 in.); tail, 69.1 mm. (2.72 in.); tarsus, 21.1 mm. (.83 in.); bill from nostril, 8.6 mm. (.34 in.).

Specimens examined: ♂, 22; ♀, 11; young in first plumage, 1. Localities represented: *Stockton, *Placer Co., *Yuba Co., Gridley, *Red Bluff, and *Mt. Lassen, Cala.

9. Otocoris alpestris strigata *Hensh.* STREAKED HORNED LARK.

Habitat.—Coast region of Oregon, Washington [and British Columbia?], west of the Cascade Mountains, and Santa Cruz group of islands, California.

This race has credit for more streaking and more yellow than it deserves. By rumpling the feathers of the back of almost any of the other forms a heavily streaked effect may be obtained, and the extreme yellowness below of the type specimens is not supported by the small series I have before me. It is darker than any of the other races except *merrilli*, and, compared with it, is not so broadly streaked, and is browner and more yellowish tinged at all seasons. The nape is of a deep vinaceous-cinnamon while in *merrilli* it is much paler. The yellow on the throat is a little deeper and often tinges the breast, sometimes extending over the whole of the lower parts, but the amount of yellow is a most misleading and variable quantity, as we see in the other races, and I cannot but conclude that the types are birds abnormally yellow. Analogous specimens may be selected from *merrilli*, *giraudi*.

and even *arenicola*. Five spring males from Oregon show very little yellow on the breast, and one of them none. Females are but slightly tinged on the chin.

It appears to be resident in a narrow belt, of heavy rainfall, west of the Cascade Mountains. The line of 44 inches annual rainfall almost coincides with the meridian of 123° down to about Lat. 40°, while east of the mountains the rainfall is only 20 inches. It is also much warmer along the coast, so that it is natural to find the coast birds resident and those east of the mountains migratory. The great number of *merrilli* found in winter in California, as compared with *strigata*, seems to support this idea.

It is to be noted here that, starting in Mexico, the size of the Horned Larks decreases as we go north along the coast, reaching its minimum in *strigata*, while inland it increases reaching its maximum in *leucolæma*. *Merrilli* is intermediate in size between *arenicola* and *strigata*, as might be expected. I have not seen young of *strigata*.

Mr. C. H. Townsend has kindly loaned me a series of ten male Horned Larks from the Santa Cruz group of Islands, California, including the type of the race he calls *insularis*. I am much surprised to find his birds practically indistinguishable from Oregon specimens of *strigata*. They are the same size and though averaging a little darker, the nape approaching brick red, some of them can be matched by the few specimens of *strigata*, I have for comparison. I know that as a rule island birds make not only good races, but often good species, and that Oregon is hundreds of miles from these particular islands, but the fact remains that these two forms differ far less from one another than do any two of the other forms that are of the same size. The case seems parallel to that of the Carson *praticola*, and may well raise the question of what constitutes a race. The study of the Horned Larks convinces me that identical races may occur in isolated spots very much like oases in a desert, but it may be that future material will cause me to change my opinion.

Average measurements of 17 breeding males: wing, 98.8 mm. (3.89 in.); tail, 67.8 mm. (2.67 in.); tarsus, 21.1 mm. (.83 in.); bill from nostril, 9.1 mm. (.36 in.).

Specimens examined: ♂, 18, ♀, 19. Localities represented: *Ft. Steilacoom and *Shoalwater Bay, Wash.; *Salem and Albany, Ore.; Red Bluff, Gridley, Yuba Co., Summit, San Francisco, and *Santa Cruz Islands, Cala.

10. **Otocoris alpestris merrilli**, subsp nov. DUSKY HORNED LARK.

Habitat.—Eastern Oregon, Washington, and British Columbia, between the Cascade and Rocky Mountains; southward in winter into Nevada and California.

SUBSP. CHAR.—Larger, more broadly streaked above, and blacker than *strigata*, with less yellow about the head and throat, the nape pinker.

Adult male in breeding plumage (No. 19,516, Coll. Wm. Brewster, Ft. Klamath, Oregon, July 1, 1887):—Back dark sepia brown, the feathers edged with pinkish gray; back of head, nape, shoulders, and rump-band vinaceous-cinnamon, the color extending to the sides of the neck and into the white of the breast below the black jugular patch, and faintly along the sides and flanks, which are streaked with dusky; loral stripe from bill to middle of ear coverts (where it is widest and curves downward), fore part of crown, 'horns', and large jugular patch, uniform black; posterior portion of ear coverts dusky; band on forehead, stripe over eye and rest of lower parts white; eyebrow tinged with yellow; chin bright primrose yellow; wings dark like the back, the quills edged with grayish, the outer web of the first primary white-edged; tail black, two outer feathers white-edged externally and two central feathers brown, darkest at tip, and passing into the color of the rump at their base. Bill, plumbeous black, lower mandible pale buffy at base. Feet black. Wing, 103.4 mm. (4.07 in.); tail, 71.1 mm. (2.80 in.); tarsus, 21.6 mm. (.85 in.); bill from nostril, 8.9 mm. (.35 in.).

Adult female in breeding plumage (No. 19,538, Coll. Wm. Brewster, Ft. Klamath, Oregon, May 23, 1887):—Above broadly streaked with deep sepia brown, the feathers edged with pinkish gray, head more narrowly, and nape but slightly, streaked; nape, etc., paler than in male, the shoulders largely dusky; black jugular patch small and ill-defined; no black cap back of forehead, and loral stripe only indicated by dusky; chin tinged with primrose yellow; eyebrows and lower parts white. Wing, 94.5 mm. (3.72 in.); tail, 63.5 mm. (2.50 in.); tarsus, 19.1 mm. (.75 in.); bill from nostril, 8.6 mm. (.34 in.).

Male in autumn plumage (No. 18,857, Coll. Wm. Brewster, Ft. Klamath, Oregon, Sept., 13, 1887):—Similar to breeding plumage, but softer, grayer, and pinker, pinkish gray edging of the feathers obscuring the dark color along the shafts as well as the white forehead and black cap; buffy tips cloud the other black areas, and the breast is clouded with dusky spotting below the jugular patch.

Female in autumn plumage (No. 18,852, Coll. Wm. Brewster, Ft. Klamath, Oregon, Oct. 26, 1887):—Similar to breeding plumage, but softer, grayer, and pinker; grayish wash across breast obscurely streaked.

Young in first plumage (♂, No. 19,524, Coll. Wm. Brewster, Ft. Klamath, Oregon, July 1, 1887):—[Described as *strigata*, Auk, Vol. V, 1888, p. 260.] Above brownish black * * * conspicuously varie-

gated with white or soiled white markings * * *; underparts soiled white, the cheeks and jugulum flecked with dusky, the breast and sides, obscurely spotted with dull black [quoted in part].

This is the blackest-backed of all the races, the dark brown of *strigata* having a decidedly yellowish shade, particularly in autumn specimens, whereas *merrilli* is black-brown in spring and strikingly grayish and streaked in autumn. Sometimes it shows as much yellow as *strigata*, chiefly in autumn specimens, but it is a larger bird, so that size and color combined generally suffice to determine doubtful specimens. Certain pale birds of large size indicate an approach to *leucolæma*, and probably come from an intermediate breeding area. The breeding range of *merrilli* includes the eastern portions of Oregon and Washington and the plains of the Fraser River. How far eastward it extends remains to be proved. Birds from western Montana approach this form, having yellow on the breast and darker streaked backs than average *arenicola*, to which form, however, it is perhaps best to refer such specimens. In winter it ranges as far south as Carson and San Francisco. *Merrilli* is certainly intermediate, but so are other races, and as this one is constant over a considerable area, it seems advisable to name it. This, it is only fair to say, Mr. Wm. Brewster proposed to do some years ago, and at his suggestion I name it after Dr. J. C. Merrill, U. S. A., to whose efforts a fine series of specimens is due. (Cf. Auk, Vol. V, 1888, p. 259.)

Average measurements of 20 breeding males: wing, 101.6 mm. (4.00 in.); tail, 69.6 mm. (2.74 in.); tarsus, 21.1 mm. (.83 in.); bill from nostril, 9.4 mm. (.37 in).

Specimens examined: ♂, 62; ♀, 35; young, first plumage, 11. Localities represented: *Ashcroft, *Kamloops, and Chilliwask, B. C.; Walla Walla, Wash.; *Umatilla Agency, Camp Harney, *Ft. Klamath, Ore.; Carson and Steamboat Valley, Nev.; *Mt. Shasta, Ft. Crook, Gridley, Marysville, and Stockton, Cala.

11. Otocoris alpestris pallida *Townsend*, MS.

Habitat. — Lower California and Sonora. Mr. C. H. Townsend has recently described a race from Lower California and kindly permitted me to examine his type. Mr. W. E. Bryant has also sent me a pair of this race, and informs me that they are typical of others from the same locality. It is the smallest and

most pallid of any yet described, and resembles most a miniature *arenicola*. The white edging of the feathers of the back, particularly the secondaries, is very marked. While material is so meagre it is hardly safe to assign a definite habitat, but this probably represents a desert seashore race. A female, worn and faded, from Tehuantepec is perhaps referable to this race, but I imagine Mexico has still some curious facts to disclose regarding its resident Horned Larks.

Average measurements of 2 breeding males: wing, 95.0 mm. (3.74 in.); tail, 64.0 mm. (2.52 in.); tarsus, 19.6 mm. (.77 in.); bill from nostril, 9.1 mm. (.36 in.).

Specimens examined: ♂, 2; ♀, 2. Localities represented: *Santa Rosalia Bay and *Magdalena Bay, Lower Cala.; *Mouth of Rio Colorado, Mexico.

I conclude this paper with a description of the seasonal differences of plumage applicable to any of the races, a key to the races based on breeding birds, a table of measurements, and a map of North America showing the localities from which I have examined specimens.

COMMON CHARACTERS.

Males in breeding plumage. — Back various shades of brown, the feathers darkest along the shafts and edged with pinkish, reddish, or grayish, corresponding to the tints of the nape, and producing a mottled or broadly streaked appearance; back of head, sides of neck and nape (generally in marked contrast to the back) pinkish, vinaceous, or reddish, extending to the black of the jugulum and along the sides and flanks; shoulders and a band on rump, usually redder than the nape; fore part of crown, erectile 'horns,' a broad loral stripe, extending wider below the eye into the middle ear-coverts, and a crescentic patch on the jugulum, curving below from shoulder to shoulder, uniform black; frontal band, a broad superciliary stripe, the middle of the ear-coverts (often interrupted with dusky), chin, throat, and remaining lower parts white, usually tinged about the head with yellow which is brightest on the chin and sometimes washes the breast; flanks obscurely streaked with dusky; tibiæ like sides or duller, sometimes pale yellow; wings similar in color to the back, rather darker, the quills whitish-edged; tail black, outer web of exterior feathers chiefly white, and color of rump-band shading off into the pale brown of the two central feathers. Bill plumbeous black, lower mandible paling from tip to base. Feet black.

As but one moult takes place in the year (at the end of the breeding season), the breeding plumage is the direct result of the wearing and

fading of the autumn plumage, each individual feather wearing away at the points of least resistance, chiefly the tip. As the feathers of the back are darker at the base they fade least, the yellow ones fade most, while the vinaceous tints of the neck are often deeper in summer than in spring when the grayish tips are longer, consequently:

Adult males in autumn plumage differ from breeding birds only in softer plumage and more blended colors; grayish, yellowish, or brownish tips obscure the whole of the upper parts, producing a grayer or darker, more broadly and indistinctly streaked appearance; yellowish tips obscure more or less the black areas; and dusky tips just below the black crescent produce a clouding or indistinct spotting across the breast. The yellows are much brighter.

Young of the year are usually more conspicuously spotted, washed with buffy across the breast, and browner and darker above, with smaller bills.

Females in breeding plumage.—Smaller than males; black areas more restricted and less clearly defined; streaked continuously above from frontal band to rump-band, lines narrowest on the head and fewest on the nape, sometimes forming a black patch (rarely as distinct as in the most indistinct male) on the fore part of the crown; frontal band often narrow and obscure; shoulders and ear-coverts frequently obscured with dusky; otherwise similar to the male.

Adult females in autumn plumage. — Plumage softer and colors more suffused than in breeding dress, grayish, brownish or yellowish tips obscuring the various areas of color. Brownish wash and dusky spotting on the breast more or less distinct.

Young of the year usually darker and browner above, the breast below the crescent more conspicuously washed with buffy and more heavily spotted with dusky brown.

Young in first plumage. — Above dusky, brownish or buffy, conspicuously dotted from bill to tail with white; wing-quills and coverts edged with buffy; below white, spotted (more or less) across the breast with dusky, often on a buffy wash. This plumage is completely moulted in acquiring the autumn dress which varies but little from that of the adult. The feathers of the back are first replaced, those of the shoulders next, then the wing-quills, beginning with those nearest the body, and when the spotted plumage has nearly all disappeared, the head changing last, the black about the head and then that of the jugular crescent begins to show, and the tail feathers appear last of all. Bill and feet pale yellowish.

KEY TO MALES, BASED ON BREEDING PLUMAGE.

A. Backs grayish or brownish.

a. Colors pale, nape, shoulders and rump-band pinkish; colors generally grayer in autumn.

a'. No yellow anywhere; wing, 111.8 mm. (4.40 in.). *leucolæma.*

b'. Yellow on throat.

a''. Back dark, eyebrows always white; colors darker in autumn; wing, 104.1 mm. (4.10 in.). *praticola*.

b''. Back pale; yellow usually brighter in autumn; wing, 104.1 mm. (4.10 in.). *arenicola*.

c''. Back very pallid; wing, 95.0 mm. (3.74 in.). *pallida*.

d''. Back light gray; wing, 97.8 mm. (3.85 in.). *giraudi*.

b. Colors dark, nape, etc., reddish; colors generally darker in autumn.

a'. Browner, less streaked, eyebrows and throat always yellow; wing, 109.2 mm. (4.30 in.). *alpestris*.

b'. Darker, more streaked, eyebrows and throat sometimes white.

a''. Back blacker, nape paler; grayer in autumn; wing, 101.6 mm. (4.00 in.). *merrilli*.

b''. Back yellower, greenish tinged, nape darker; yellower in autumn; wing, 99.1 mm. (3.90 in.). *strigata*.

B. Back reddish; usually darker in autumn.

a. Colors of nape in marked contrast to the back; wing, 99.1 mm. (3.90 in.). *chrysolæma*.

b. Colors of nape merging into those of the back.

a'. General appearance rich rufous; wing, 99.1 mm. (3.90 in.). *rubea*.

b'. General appearance pallid and scorched; wing, 102.9 mm. (4.05 in.). *adusta*.

KEY TO FEMALES, BASED ON BREEDING PLUMAGE.

A. Back grayish or brownish; usually darker in autumn.

a. Eyebrow and chin always yellow; dark colors; wing, 101.6 mm. (4.00 in.). *alpestris*.

b. No yellow anywhere; wing, 104.1 mm. (4.10 in.). *leucolæma*.

c. Eyebrow and chin usually yellow, often white.

a'. Back pale gray; wing, 88.9 mm. (3.50 in.). *giraudi*.

b'. Back pallid; wing, 96.5 mm. (3.80 in.). *arenicola*.

c'. Back very pallid; wing, 88.9 mm. (3.50 in.). *pallida*.

d'. Back dark.

a''. Blackish brown, darker in autumn; eyebrow always white; wing, 96.5 mm. (3.80 in.). *praticola*.

b'' Blackish brown, more broadly streaked; grayer in autumn; wing, 95.3 mm. (3.75 in.). *merrilli*.

c''. Yellowish brown; yellower in autumn; wing, 91.4 mm. (3.60 in.). *strigata*.

B. Back reddish, usually darker in autumn.

a. Ruddy-tinged; wing, 91.4 mm. (3.60 in.). *rubea*.

b. Yellowish-tinged; wing, 92.7 mm. (3.65 in.). *chrysolæma*.

c. Pallid; wing, 95.3 in. (3.75 in.). *adusta*.

KEY TO YOUNG IN FIRST PLUMAGE.

A. Black and white above.
- *a.* Spotting whiter. — *merrilli.*
- *b.* Spotting more buffy. — *leucolæma.*

B. Dark brown above.
- *a.* White below, heavily spotted on breast. — *praticola.*
- *b.* Yellow-tinged throughout, less spotted. — *alpestris.*
- *c.* [Probably similar to *alpestris*]. — *strigata.*

C. Pale brown above.
- *a.* Darker and grayer. — *giraudi.*
- *b.* Paler and browner. — *arenicola.*
- *c.* [Probably similar to *arenicola.*] — *pallida.*

D. Reddish brown above.
- *a.* Dark. — *chrysolæma.*
- *b.* Ruddy. — *rubea.*
- *c.* Pale. — *adusta.*

TABLE OF MEASUREMENTS (IN MILLIMETERS).

No. of specimens.		WING.			TAIL.			TARSUS.			*BILL (from nostril).		
		Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.
	MALES.												
25	leucolæma	111.5	115.8	108.0	74.7	78.7	69.3	22.4	23.4	21.1	9.7	10.4	8.4
30	alpestris	109.7	114.8	106.2	74.2	80.3	67.6	23.4	25.4	21.6	10.2	11.2	8.9
30	arenicola	104.9	107.7	101.1	71.9	76.7	64.0	21.3	22.6	19.6	9.7	10.2	8.9
30	praticola	103.9	107.4	99.6	72.9	76.2	68.6	21.1	22.1	19.6	9.4	10.2	8.4
30	adusta	102.9	108.7	99.6	71.1	74.9	68.1	20.6	22.1	19.1	9.4	10.7	8.4
30	merrilli	101.9	104.9	98.6	70.4	73.7	66.0	21.1	22.9	19.8	9.4	10.2	8.4
30	chrysolæma . .	99.3	104.6	93.5	68.3	72.4	63.5	20.8	22.4	19.1	9.4	10.7	8.4
17	rubea	99.1	104.6	96.0	67.1	71.1	66.0	21.1	22.1	20.1	9.1	9.9	8.1
19	strigata	98.6	101.6	92.5	67.6	71.9	63.5	20.8	22.6	19.3	9.1	10.2	8.1
25	giraudi	96.3	102.6	92.5	65.0	68.6	61.0	21.3	22.4	20.3	9.1	9.9	8.1
2	pallida	95.0	95.3	94.7	64.0	64.3	63.5	19.6	19.6	19.6	9.1	9.1	9.1
	FEMALES.												
10	leucolæma	104.6	106.2	102.1	68.3	71.4	62.2	21.6	22.9	20.8	9.1	10.4	8.4
30	alpestris	101.6	104.6	97.5	66.0	70.6	59.7	22.4	23.6	20.8	9.1	10.9	8.4
30	arenicola	97.0	101.6	92.0	64.5	68.6	60.5	20.3	21.6	19.1	8.9	9.7	8.1
30	praticola	97.3	101.1	92.7	65.0	71.9	61.0	20.8	22.1	19.6	8.9	9 9	8.1
20	adusta	95.8	98.6	94.0	63.2	66.6	58.4	20.3	21.1	18.5	8.6	9.7	8.1
30	merrilli	95.5	99.8	92.0	63.5	70.6	59.7	20.3	21.8	19.1	8.6	9.9	7.9
25	chrysolæma . .	92.5	96.0	89.7	61.2	66.0	57.9	20.1	20.8	18.8	8.6	9.1	8.1
9	rubea	91.4	94.0	89.7	61.7	64.0	58.4	20.3	20.8	19.6	8.6	9.4	7.9
17	strigata	91.7	96.8	89.4	61.0	65.5	57.2	20.1	21.3	19.3	8.6	9.1	8.1
18	giraudi	88.6	92.0	85.1	56.9	60.5	53.9	20.6	21.6	17.8	8.6	9.7	8.1
2	pallida	89.7	90.2	88.9	56.9	57.9	55.9	20.0	20.1	19.8	8.6	8.9	8.1

*Culmen averages about one fifth larger.

Wing measurement is chord from carpal joint to end of first primary.

Tail measurements is from insertion of two central rectrices to end of longest.

A NEW VIREO FROM CALIFORNIA.

BY F. STEPHENS.

Vireo vicinior californicus, subsp. nov.
CALIFORNIA GRAY VIREO.

Darker than *Vireo vicinior* Coues. Above grayish-plumbeous, middle and greater wing-coverts, secondaries, tertials, and outer web of outer tail-feathers more or less edged with grayish white. Wing and tail of equal length. Nest not pensile, and not built in thorny bushes.

For many years I have thought the California Gray Vireo varietally distinct from the form that breeds east of the Colorado River, and I now venture to describe it as such. The difference in climate of the breeding habitats of the two forms is sufficient to account for their differentiation. I feel inclined to give the new form specific rank, as I am unacquainted with any intermediate specimens, and from the nature of the country intervening between the breeding range of the two forms I should not expect to find such, since that region is so barren that the species does not occur at all.

The most prominent difference between the two forms is the darker color above, combined with the greater amount of whitish edging on wing and tail, in the California form.

A comparison of a nest and set of four eggs taken ten miles east of Riverside, California, on April 26, 1889, and now before me, with the description given by W. E. D. Scott in 'The Auk' (Vol. II, Oct., 1885, pp. 321-326) of nests and eggs obtained by him in Arizona, indicate that my nest is smaller, especially in inside diameter, and that my eggs are longer in proportion. This nest was about four feet from the ground, and is composed of dry outside parts or fibres of a flax-like plant, gray in color, and is lined with the fine, dry, yellowish-colored stems of 'six weeks grass.' Width of nest outside, 3 inches; inside, 1 3-4 inches; depth outside, 2 3-4 inches; inside, 1 3-4 inches. The eggs measure .73 × .57, .74 × .55, .74 × .55, and .77 × .53 inch. Their colors are similar to those of *V. vicinior* described by Scott.

Each of the three nests that I have found was similarly situated in the middle of thick bushes, growing thickly among others of their kind on the slopes of mountains, forming the hundreds of thousands of acres of brush land, known locally as 'chaparral' or 'chemise,' which is the sole habitat of *Vireo vicinior californicus*. I find this variety only between the altitudes of 2000 and 4000 feet, principally from 3000 to 3500. They appear early in April, and are gone by September. Probably two broods are raised.

A STUDY OF THE GENUS *DENDRORNIS* AND ITS SPECIES.

BY D. G. ELLIOT.

Among the difficult groups in ornithology, the Dendrocolaptidæ occupy a prominent position, and the species of the genus *Dendrornis* are not the least puzzling of its members. These bear, as a rule, so close a resemblance to each other, that at times, from descriptions alone, it is impossible to determine exactly which species may be under consideration, and ornithologists have frequently been obliged to transmit their material to those who have access to the types, in order that their examples might be correctly named. Fully aware of the difficulties that other naturalists have had to contend with in their work on this genus, I should never have attempted its revision, had I not been able to obtain a large number of the type specimens described from time to time, and so to have a tangible, indisputable starting point, from which to base my conclusions. Of the thirty-one forms, that have been named as belonging to this genus, I have procured no less than fourteen types, and among the other examples in my possession are some that have been compared and identified with the types of other species by ornithologists who have paid especial attention to these perplexing birds.

My material consists of one hundred and seventy-seven specimens, obtained from the following sources: the Boston

Society of Natural History,—a large series with Lafresnaye's types; the National Museum at Washington,—another large series with the types of Mr. Ridgway's lately described forms; the material in the collections of the American Museum of Natural History in New York, with Mr. Lawrence's types; the specimens contained in the Museum of Comparative Zoölogy of Cambridge; those of the Academy of Natural Sciences of Philadelphia, and some specimens from the collection of my friend, Mr. G. B. Sennett. Many of the specimens in Mr. Lawrence's collections and also in the National Museum have been identified by Mr. Sclater, Mr. Salvin, Herr von Berlepsch and others, and in some instances examples from the private collections of these gentlemen were present in one or other of the series committed to my charge, showing what they considered a certain species to be, at all events at the time they identified that particular example. A change of opinion regarding the proper name to be applied to any specimen of this genus, judging from the labels borne by a number of them, seems to have been admissible, even if of very frequent occurrence.

The types in my possession while preparing this paper, are the following: *D. weddelli* Lafres., *D. nana* Lawr., *D. multiguttata* Lafres., *D. lacrymosa* Lawr., *D. guttatoides* Lafres., *D. triangularis* Lafres., *D. mentalis* Lawr., *D. fraterculus* Ridgw., *D. lawrencei* Ridgw., *D. lawrencei costaricensis* Ridgw., *D. punctigula* Ridgw., *D. albisquama* Lafres., *D. peruana* Lafres. MS., and *D. albirostris* Lafres. MS. Beside these I have a typical specimen of *D. chunchotambo* Tschudi, procured by the describer of the species during his journey in Peru, and typical specimens of *D. rostripallens* Lafres. Of many of the species I have a considerable number of examples, sometimes large series, as in *D. flavigaster* Swain., represented by no less than sixty specimens, so that altogether I think I may consider that my material is as ample as any that may have been at the command of anyone who has paid especial attention to this genus, and far greater and more complete than has been at the service of the majority of ornithologists.

In my conclusions, in so far as the species were represented before me, I have been guided solely by my material, and although I am well aware that in this age, when the 'pendulum' has swung almost to the verge of the 'splitters' limit, to some many of my determinations may not be acceptable, yet I am satisfied that an

examination of my material by any unbiased naturalist, would permit no other conclusions to be arrived at than those expressed in these pages. It is not pleasant to disagree with those working in the same field, and wherever a shadow of a doubt existed, I have preferred to give the benefit of that 'shadow,' if any could be derived from it, to a fellow ornithologist, but when my material caused me to believe that an error had been committed, I have not hesitated to say so, with my reasons for such belief.

I have found that measurements, taken as a basis of scientific value in this group, are of little worth, as examples of the same species vary in their dimensions even from the same locality, and when such differences were considerable I have given the extreme measurements of the specimens before me, beside those of the example described. The length of the bill given is always that of the exposed culmen.

Knowing by experience how extremely difficult it is to distinguish closely allied species of this genus by descriptions only, and not hoping to be more successful in this respect than any of those who have written upon this group, I have constructed a key, containing distinctive characters, or the salient character of each species, by the aid of which, I trust, little difficulty will be met with by any one in deciding what particular species he may have before him. Of course, to those who consider that this genus should contain races, sub-races, etc., not recognized in this paper, and not apparent to the author, the key will only be useful up to a certain point, beyond which they must provide their own conveyance for farther travel. I have not attempted to quote what might be considered a full synonymy for each species, as in many cases where the name only was given, no description having been added, it was impossible to determine with any degree of accuracy what was the species intended. That errors were made, was shown in certain instances, where an author in a subsequent paper had altered the name previously given to his specimen, to that representing quite a different species. It therefore seemed best, when no description was given, and access to the specimen mentioned was not available, that in the great majority of cases no notice of its occurrence should be taken, and that I should confine myself to such references, regarding which there was no reasonable doubt as to what species was mentioned. To cite an instance of the difficulty of

knowing what species was intended by a name only, I would mention the three species, *susurrans*, *pardalotus* and *nana*, which have been confounded together by most writers, but which my material shows are quite separable. To quote any of these, especially the last (which seems not to have been distinguished at all by many authors), where a name only was given, with perhaps no authentic locality, would possibly only serve to perpetuate an existing error. I have therefore given only such synonomy as I was able to verify with some considerable degree of certainty. Seven described species I have not seen, and they are not represented, so far as I am aware, by any specimen in the United States. They are *kieneri*, *ocellata*, *elegans*, *spixi*, *palliata*, *polysticta*, and *obsoletus*.* I have therefore given the original descriptions without any comments, as it is impossible to definitely fix their specific status without seeing the types.

It only remains for me to express my thanks to those gentlemen who have aided me by the loan of specimens, and kindly given such other assistance as was in their power, among whom I would especially mention Mr. C. B. Cory for the large series of specimens and types from the Lafresnaye collection, without which no conclusive or satisfactory paper could be written on this genus; Mr. R. Ridgway of the National Museum, Washington; Mr. W. Brewster of the Museum of Comparative Zoölogy, Cambridge, Mass.; Mr. W. Stone of the Academy of Natural Sciences, Philadelphia; Prof. J. A. Allen and Mr. F. M. Chapman of the American Museum of Natural History, New York; and Mr. Geo. B. Sennett.

LITERATURE OF THE GENUS.

In reviewing the literature of *Dendrornis*, I confine myself mainly to those authors and works by which new species have been introduced to ornithologists; or to those where certain forms are described that our present knowledge hardly permits us to accept as entirely worthy of occupying distinct positions among the

* Of the above desiderata, specimens of *ocellata*, *elegans*, and *spixi*, collected by Natterer, have been forwarded to the American Museum of Natural History from the Vienna Museum, but have not been received in time for me to remark upon them in this paper. [See p. 207 of this number of 'The Auk.'—ED.]

species of the group. As the earliest writer on the birds of this genus does not date back of 1818 I am fortunately not required to decide which is the proper edition of Linnæus's 'Systema Naturæ' for ornithologists to consider as the true and only starting point.

1818. LICHTENSTEIN, *Abhand. Königl. Akad. Wissens.*—Two species are here described as *Dendrocolaptes guttatus*, and *D. obsoletus*. . . . . Species 2.

1818. VIEILLOT, *Nouveau Dictionnaire d'Histoire Naturelle.—Dendrornis pardalotus* described as *Dendrocopus pardalotus*. . . . . Species 3.

1824. SPIX, *Avium species novæ quas in itinere per Brasiliam.—D. ocellata* described as *Dendrocolaptes ocellatus;* and *D. tenuirostris* (nec Licht.) described under the genus *Dendrocolaptes*. . . . . Species 5.

1827. SWAINSON, *Philosophical Magazine.—D. flavigaster* described as *Xiphorhynchus flavigaster*. . . Species 6.

1831. LESSON, *Traité Ornithologie.—Dendrocolaptes tenuirostris* Spix, re-named *Picolaptes spixi*, which specific name stands, as *tenuirostris* had already been employed by Lichtenstein.

1842. LAFRESNAYE, *Revue et Magasin de Zoologie.—Dendrornis triangularis* described as *Nasica triangularis*. Species 7.

1843. LESSON, *Echo du Monde Savant.—D. flavigaster* Swain. re described as *Dryocopus eburneirostris*.

1844-46. TSCHUDI, *Untersuchungen über die Fauna Peruana.— Dendrornis chunchotambo* described. . Species 8.

1847. JARDINE, *Annals and Magazine of Natural History.—D. susurrans* described as *Dendrocolaptes susurrans*. Species 9.

1850. LAFRESNAYE, *Revue et Magasin de Zoologie.—D. d'orbignyanus*, *D. multiguttata*, and *D. guttatoides* described under the genus *Nasica*. . . . . Species 12.

1852. LAFRESNAYE, *Revue et Magasin de Zoologie.—D. susurrans* re-described as *Nasica beauperthuysii* and *N. albisquama*.

1852. EYTON, *Jardine's Contributions to Ornithology.—D. multiguttata* re-described as *Picolaptes notatus*.

MAP
SHOWING
DISTRIBUTION AND BREEDING AREAS
OF THE
HORNED LARKS OF NORTH AMERICA.
1890.
EXPLANATION.
Area 1. alpestris.
" 2. leucolæma.
" 3. praticola.
" 4. giraudi.
" 5. arenicola.
" 6. adusta.
" 7. chrysolæma.
" 8. rubea.
" 9. strigata.
" 10. merrilli.
" 11. pallida.
Indicates that the bird breeds.
" occurrence only.
ALASKA
GREENLAND
HUDSON'S BAY
LABRADOR
NEWFOUNDLAND
BRITISH COLUMBIA
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO TERRITORY
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
TEXAS
MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
INDIAN TERRITORY
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
ONTARIO
QUEBEC
MAINE
N. B.
GULF OF MEXICO
ATLANTIC OCEAN
CUBA
1
2
3
4
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6
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8
9
10
11

1853. SCLATER, *Proceedings of the Zoölogical Society of London.—D. eytoni* described as *Dendrocolaptes eytoni.* Species 13.

1856. LAFRESNAYE, *Castelnau Voyage de l'Amérique du Sud.—D. weddelli* and *D. rostripallens* described. Species 15.

1856. DES MURS, *Castelnau Voyage de l'Amérique du Sud.—D. kieneri* and *D. palliata* described. . . Species 17.

1856. SCLATER, *Proceedings of the Zoölogical Society of London.—D. erythropygia* described. . . Species 18.

1862. LAWRENCE, *Annals of the New York Lyceum of Natural History.—D. lacrymosa* described. . . Species 19.

1863. LAWRENCE, *Ibis.—D. nana* described. . Species 20.

1867. LAWRENCE, *Annals of the New York Lyceum of Natural History.—D. flavigaster* Swain. re-described as *D. mentalis.*

1868. PELZELN, *Ornithologie Brasiliens.—D. elegans* described. . . . . Species 21.

1883. SALVIN and GODMAN, *Ibis.—D. polysticta* described. Species 22.

1883. BERLEPSCH and TACZANOWSKI, *Journal für Ornithologie.—D. erythropygia* Sclat. re-described as *D. erythropygia æquatorialis.*

1884. RIDGWAY, *Proceedings of the United States National Museum.—D. nana* Lawr. re-described as *D. lawrencei.*

1887. RIDGWAY, *Proceedings of the United States National Museum.—D. susurrans* Jardine re-described as *D. fraterculus.*

1888. RIDGWAY, *Proceedings of the United States National Museum.—D. punctigula* described. . . . Species 23.

1889. RIDGWAY, *Proceedings of the United States National Museum.—D. nana* Lawr. re-described as *D. lawrencei costaricensis.*

GENERA.

The birds enumerated in this paper had been assigned by different writers to various genera of the family Dendrocolaptidæ until 1851, when Eyton, in 'Jardine's Contributions to Ornithology,' proposed for them the term *Dendrornis* with the following characters: "Bill nearly straight, of moderate length, the upper mandible hooked at the tip, fourth quill longest." These characters are comparative rather than positive, with the exception of the last, and yet perhaps they are the best that can be given, as

the bill, which is the main distinction, varies considerably among the different species, some being much more slender and comparatively longer than others, almost in some instances verging upon *Picolaptes*. The third and fourth quills are equal and longest (rather than fourth quill longest as given by Eyton), and in this respect resemble the species of other genera of the family. I do not think it is possible to define any characters that will serve to absolutely distinguish the members of *Dendrornis* from their relatives, and yet when the general stoutness of the bill together with the usual pattern of markings are considered together, the birds form a tolerably recognizable group. Reichenbach in his 'Handb. Spec. Ornith.,' p. 186, proposed for *D. guttata* the generic term *Premnocopus*. This however had already been employed by Cabanis for another group of birds.

GEOGRAPHICAL DISTRIBUTION.

The members of the genus *Dendrornis* are dwellers of the Neotropical Region, their most northern habitat being the Mexican Sub-region. Here, in the vicinity of Mazatlan on the west and Tampico on the east, we find the *D. flavigaster*, which extends its range into Central America as far as the confines of Costa Rica, and *D. erythropygia* ranging from Jalapa through Central America, and as far south as Ecuador. *D. lacrymosa* goes from Costa Rica through the Isthmus of Panama into Colombia. *D. punctigula* is, so far as known, restricted to Costa Rica and Colombia, not being a native of Panama, but represented there by *D. erythropygia*, a singular distribution, and not easily accounted for. *D. nana* ranges from Honduras into Colombia. Colombia (Colombian Sub-region), beside the species already given, contains *D. rostripallens*, which extends into Ecuador and is also found at Matto Grosso, Brazil, on the borders of Bolivia, possibly being a native also of that country; and *D. guttatoides*, also stated to be a native of British Guiana and Cayenne (Amazonian Sub-region), but not as yet found in Venezuela. Tobago and Trinidad contain *D. susurrans*, also met with in Venezuela and at Santarem, Brazil, in the Amazonian Sub-region. Guiana also contains *D. polysticta*, *D. pardalotus*, not found elsewhere, and, according to Sclater, also *D. multigutatta*. Brazil possesses a large number of these birds. In the Amazonian Sub-region we

have from Para, *D. spixi*, *D. palliata*, *D. obsoletus*, and *D. cytoni*; the last is also found at Santarem, where *D. multiguttata* is met with. *D. ocellata* comes from Piauhy, and *D. guttata* appears to be confined to Bahia. *D. elegans* was procured at Engenho do Gama, and is also a native of Peru; while *D. d'orbignyanus* is found at Matto Grosso in the west of Brazil and also in Bolivia. *D. triangularis* is met with in Ecuador, Peru, and Bolivia of the Colombian Sub-region, while *D. chunchotambo* is apparently confined to Peru.

KEY TO THE SPECIES.

A. Back uniform.
  a. Throat buff. Bill strong, longer than head.....1. *D. weddelli.*
  b. Throat pure white. Bill small, long as head.....2. *D. kieneri.*
  c. Throat buff, feathers margined with dark brown....3. *D. ocellata.*
B. Back striated, under parts not dark olive, markings linear.
  a. Throat white, feathers margined with dark brown.
    4. *D. susurrans.*
  b. Throat deep rusty buff, feathers margined with black.
    5. *D. pardalotus.*
  c. Throat uniform buff. Under parts yellow olivaceous brown.
    a'. Back with lanceolate dark buff stripes, margined with black; breast striped with deep buff, margined with black.....6. *D. nana.*
    b'. Back with broad pale buff stripes margined with black; breast and abdomen with broad buffy-white stripes margined with black.....7. *D. multiguttata.*
  d. Throat pale or whitish-buff, feathers with dark margins.
    a'. Back with narrow buff lines.....8. *D. chunchotambo.*
    b'. Back with pear-shaped buff lines.....9. *D. elegans*
  e. Throat uniform buffy-white.
    a'. Bill: maxilla brown, mandible yellow. Under parts with narrow oblong fulvous spots.....10. *D. spixi.*
    b'. Bill entirely yellow.
      a''. Underparts with large whitish-buff spots, margined with black, spots growing smaller on abdomen .....11. *D. palliata.*
      b''. Underparts rather broadly striated with pale buff, margined with black.....12. *D. flavigaster*
    c'. Bill blackish, base of mandible yellowish.
      a''. Large buff spots on back and breast; abdomen striped conspicuously with pale buff margined with blackish-brown.....13. *D. lacrymosa.*
      b''. Small buff spots on back and breast; abdomen nearly uniform brown.....14. *D. polysticta.*

f. Lower part of breast and abdomen fulvous striped with buff.
a'. Buff stripes on lower part of breast and abdomen without dark margins.
a''. Bill black; throat white; upper part of breast with large buffy-white spots, margined with black.....15. *D. eytoni.*
b''. Bill yellowish-white. Buff spots on upper and lower part of body without black margins.....16. *D. d'orbignyanus.*
c''. Bill pale horn-color; buff stripes on upper part of breast margined with black.....17. *D. rostripallens.*
b'. Buff stripes on breast and abdomen margined with black.
a''. Bill half as long again as head. Throat and stripes on breast deep rusty-buff.....18. *D. guttata.*
b''. Bill short, stout, long as head. Throat and stripes on breast whitish-buff.....19. *D. guttatoides.*
C. Back striated. Entire underparts dark olive covered with triangular yellowish-white spots.
a. Lower back bright olive. Back with few narrow buffy-white lines on upper part.....20. *D. triangularis.*
b. Lower back cinnamon-red.
a'. Back olive brown, with numerous lengthened buffy-white spots.....21. *D. erythropygia.*
b'. Back olive brown with narrow whitish-yellow stripes on upper part.....22. *D. punctigula.*

The description of *D. obsoletus* Licht, is so meagre and unsatisfactory, that it is impossible to assign to it any place in the above key.

Dendrornis weddelli.

Dendrornis weddelli LAFRES. DES MURS, Voy. Castel. Amer. Sud. Ois. p. 46, Tab. xiv, fig 2. (1856).

Habitat.——?

Crown and nape reddish-brown, with pear-shaped spots of buff, minute on forehead, more elongated on nape. Back uniform reddish-brown, the shafts of feathers buff. Rump and upper tail-coverts cinnamon-red. Throat buff, each feather margined with a narrow blackish-brown line; this becoming broader and more conspicuous on the buff markings on the lower part of the neck. Under parts olive brown, each feather with a lengthened pear-shaped pale buff spot without any dark margin, these spots becoming obsolete on the abdomen. Under tail-coverts olive brown with a reddish tinge. Wings cinnamon. Tail cinnamon-red, much darker than the wings. Bill very long, slender and pointed; horn-brown on maxilla, pale yellow on mandible. Feet pale brown. Length 8½ in. Wing 3½ in. Tail $3\frac{3}{16}$ in. Bill $1\frac{2}{12}$ in. Description taken from type, No. 2267, Coll. Boston Soc. Nat. Hist.

The types of this species are before me from the Lafresnaye collection, and they appear quite distinct from all others of this genus. The figure in Des Murs's work (l. c.) gives no idea of the bird, and is, like all the other figures of *Dendrornis* in the volume, apt to mislead, as they are quite unlike the specimens, both in color and in shape and distribution of the spots. *D. weddelli* is remarkable for its long and slender bill, which is quite straight with the gonys very long and ascending. The maxilla is slightly hooked at the point. Des Murs gives no habitat for the species, nor is any mentioned on the labels. Mr. Sclater states in P. Z. S., 1871, p. 86, that he had compared his specimens, designated by him heretofore as *D. palliata*, with the *marked types of D. weddelli* in the Paris Museum and "found them identical with it and not with *D. palliatus*." A doubt arises here in my mind whether after all specimens marked *D. weddelli* were really that species. Des Murs gives the name of *D. weddelli* as a MS. one conferred by Lafresnaye, and the author of the birds of Castelnau's 'Voyage' does not say that the type or any specimens of *weddelli* are in the Paris Museum; while Lafresnaye's collection contains two specimens marked as *the* types of the species, while they are also enumerated as such in the catalogue, made by Jules Verreaux, of the collection in Paris, before it was sold to Dr. Bryant and brought to Boston. On the other hand, *D. palliatus* Dev. and Des Murs is not contained in the Lafresnaye collection and would naturally be supposed to be among Castelnau's birds in the Paris Museum. I do not mean to argue that *D. weddelli* is not represented in the Paris Museum collection, but I doubt very much if any specimen there is rightly labelled as a type of the species. The two are apparently very distinct, the form and length of the bill of *D. weddelli* being quite different from that of the other species of *Dendrornis*, and neither agrees with the typical specimen of *D. chunchotambo* Tsch. before me, which has been considered as a synonym of *D. ocellata* Spix by some writers.

Dendrornis kieneri.

Dendrornis kieneri DES MURS, Voy. Amer. Sud. Ois. p. 45, pl. 14, fig. 1. (1856).

Habitat.—Ega, Brazil.

"D. suprà cinnamomeo-rufus; secundariis rectricibus fuscioribus; tergo dilutiore; capite, genis, colloque postico ferè nigris, fulvoalbide stricto

flammulatis; remigum primariis apice nigricantibus; rectricibus apice elongato-acuminatis. Subtùs fulvo-rufus; gutture albescente; pectore albido flammato, maculis nigro circumcinctis; abdomine fulvo-albido striato. Rostro minore corneo. Pedibus brunneis."

"Dessus de la tête et derriere du cou d'un noirâtre beaucoup plus prononcé que dans le *D. rostripallens;* chaque plume striée de raies d'un fauve blanchâtre s'épanouissant en forme de larmes par le bas, où la bordure noire qui les encadre les fait ressortir avec plus d'éclat; dos d'un brun roussâtre, uniforme; ailes et queue d'un brun rouge-cannelle très foncé; les remiges primaires teintes d'un brun fuligineux ou noirâtre à leur pointe; menton d'un blanc presque pur. Tout le reste du dessous du corps d'un fauve roussâtre; la poitrine largement écaillee de plaques d'un blancé légèrement teinté de fauve, occupant presque toute la surface de chaque plume, et encadrée d'une fin liséré noir; le ventre strié de raies longitudinales d'un fauve blanchâtre. Bec couleur de corne, brunâtre à sa base. Pieds d'un brun noirâtre. Longueur totale 22 centimetres environ;—du bec, $2\frac{1}{2}$; du tarse, 2; de la queue près de 9; le rachis de chacune des rectrices dépassant les barbes de 1 centimetre."

The above is Des Murs's description. I have not seen this species.

Dendrornis ocellata.

Dendrocolaptes ocellatus SPIX, Av. Bras. Vol. I, p. 88. Text (1824).

Dendrocolaptes guttatus SPIX, Av. Bras. Vol. I, Tab. xci., fig. 1. (1824).

Picolaptes ocellatus LAFRES., Rev. Mag. Zool. 1850, p. 371.

Habitat.—Piauhy, Brazil (Spix).

"Sub-minor, olivaceo-castaneus, rostro fere recto, non adunco, parum compresso; gula ochracea; jugulo maculis ochraceis ocellato fuscoque fimbriato; capite nucha pectoreque fulvo strigilatis; macula auriculari crispa, fulvo-strigilata; collo antico ochraceo-guttato."

"Descriptio. Corpus Dendrocolapte guttato ac Pico minus; dorsum immaculatum corpusque subtus olivaceo-ferruginea; alæ subtus fulvæ; remiges candaque castaneæ, rectricibus intermediis ad apicem acutis; rostrum olivaceo-fuscum, subarcuatum; pedes fusco-albidi. Longitudo cor- 7′, cauda $3\frac{1}{3}$′, c. alis. l. 2′, rostri $1\frac{1}{2}$′."

The above is Spix's description of the species, and judging from this and his figures (I have not seen the type), I cannot consider that it is the same as *D. chunchotambo* Tschudi from Peru. Most of the later writers on these birds, have Tschudi's name as a synonym of *ocellatus* Spix, and while some state that they have compared their specimens with Tschudi's type, none say that they have also compared them with the type of Spix's spe-

cies. As will be noticed in my Key, the two great groups into which the known species can be divided are characterized by having the back uniform in color, or striated, and so few are the former that out of the 23 species acknowledged in this paper, but three can be placed in the first division. Now, as will be noticed, Spix says of his bird, "dorsum immaculatum," and his figure shows the back without the spots or lines. Tschudi's species has the back covered with narrow buff lines. The distinction here is important, and would alone seem to be sufficient to prevent these birds from being considered as the same species. The measurements given by Spix do not at all agree with the typical specimen of Tschudi's bird before me, being much less in all of them, except the bill, which is longer. There are other differences in color of the plumage, but not sufficiently definite for me to found an opinion, not having Spix's bird before me; but those I have given, seem to me quite enough to prevent me from considering *D. chunchotambo* as a synonym of *D. ocellata*. It remains for some one who may have an opportunity of comparing both of the types together to decide their specific standing.

Dendrornis susurrans.

Dendrocolaptes susurrans JARD. Ann. Mag. Nat. Hist. 1847, p. 81, ex Tobago.

Nasica albisquama LAFRES. Rev. Mag. Zool. 1852, p. 465.

Nasica susurrans LAFRES. Rev Mag. Zool. 1850, p. 425.

Nasica beauperthuysii LAFRES. Rev. Mag. Zool. 1850, p. 419; 1852, p. 469.

Dendrornis fraterculus RIDGW. Proc. U. S. Nat. Mus. Vol. X, 1887, p. 526, ex Brazil.

Habitat.—Tobago, Trinidad, Venezuela, Brazil, Santarem (Riker).

Bill curved at the tip, maxilla blackish brown; mandible paler; in some specimens dark brown, others yellowish. Crown, nape and cheeks dark brown, each feather with an apical, ochraceous, oval spot. Back yellowish brown, the feathers on upper portion having central, lengthened pale yellow spots, becoming gradually narrower on the middle of the back, and disappearing altogether on the lower part. Each of these yellowish spots or lines is surrounded by a narrow dark brown border. Rump, wings, and tail, reddish brown. Throat white, the feathers edged with dark brown; rest of underparts pale yellowish brown, each feather having a central oval yellowish white spot, surrounded with a border of darke

hue. These spots become gradually less and less distinct, and disappear altogether on the lower part of the breast. Feet, pale brown. Entire length, $8\frac{7}{8}$ in.; bill, $1\frac{1}{2}$ in.; wing, $4\frac{1}{2}$ in.; tail, $3\frac{1}{12}$ in. Description taken from a Tobago specimen, collected by Ober in May, in collection American Museum Natural History. Dimensions of a specimen from Venezuela collected by Coale, No. 106,047, U. S. Nat. Mus.: Length, $7\frac{1}{2}$ in.; wing: $3\frac{9}{12}$ in.; tail, $3\frac{1}{12}$ in.; bill, $1\frac{5}{12}$ in. Dimensions of type of *D. fraterculus*, wing, $3\frac{10}{12}$ in.; tail, $3\frac{7}{12}$ in.; exposed culmen, bill broken, .83.

The above description differs in some particulars from that of the type given by Jardine (l. c.) also from Tobago. He says the *mandible* is umber-brown, *maxilla* paler. This is evidently a transposition of terms, as the mandible is never darker than the maxilla, the opposite being almost always the fact. In two specimens before me, one from Venezuela collected by Coale, the other being one of the types of *N. albisquama* Lafres., the mandible is quite as dark as the maxilla, the entire bill being, in fact, nearly black. This variance of color seems, however, to be an individual characteristic, as nearly all specimens have the bill colored as described above. Jardine also states that the *nape* is yellowish brown like the back. In all my specimens the nape and crown are of the same color, and very much darker than the back. With the above discrepancies, the description of the type agrees with the specimens before me from Tobago and elsewhere. The depth of color differs in specimens, some being generally darker than others, and the spots brighter and more clearly defined, and their borders more sharply marked. This difference of hue does not occur in specimens from one locality more than from another, and evidently has no specific value whatever. One specimen from Tobago, collected by Ober in April, a month earlier than the one described above, has the throat pale buff, more like those of Central American birds, and the spots above and below are brighter, of a deeper color, and more distinct.

I have placed among the synonyms of this species *D. fraterculus* Ridgw., from Santarem, Brazil, the type of which is before me. The measurements in a series of these birds vary very considerably, and I have before me a specimen from Venezuela (measurements given above) that varies but slightly from the type of *fraterculus*. The length of bill in the latter I am unable to ascertain as only about half of it remains, the apical portion having disappeared. Mr. Ridgway gives the "exposed culmen 1.15,"

but the bill of the type specimen as received by me has the portion remaining of the exposed culmen only .83. The chestnut color of the shafts of the rectrices does not appear to be a reliable character, as these vary in a series from black to bright chestnut, and some specimens have both hues, the shafts of the median pair being black while those of the lateral feathers are chestnut. The pale buff of the throat is matched in the Tobago specimen mentioned above, and is evidently the result of individual variation, the specimens being more richly colored than is seen in the usual typical style. The rest of the plumage is, however, no brighter in either example than can be seen in the ordinary run of individual *susurrans*.

N. beauperthuysii Lafresnaye, is stated by its describer to be the same as *D. susurrans* (vide Rev. Mag. Zool. 1852, p. 469).

Dendrornis pardalotus.

Le Grimpar Flambé LEVAILL. Hist. Nat. des Promer. et des Guép. pl. 30, ex Guiana.

Dendrocopus pardalotus VIEILL. Nouv. Dict. Hist. Nat. Vol. 26, p. 117 (1818).

Dendrornis pardalotus PELZ. Ornith. Bras. p. 45 (1868).—SALV. Ibis, 1885, p. 422.

Habitat.—Guiana. Bartica Grove, Camacusa, Merumé Mountains, Roraima (3,500 feet) (Whiteley). Demarara (Ridgway).

Crown of head and nape blackish brown, each feather with a minute dark buff spot, these becoming slightly larger on the nape. Back dark yellowish brown, each feather having a pear-shaped, apical spot, surrounded by a narrow line of brownish black. Secondaries, rump and tail bright chestnut. Shoulders of wings yellowish brown. Primaries chestnut, with a considerable length of the apical portion of the inner webs, purplish brown. Throat deep rusty buff, the feathers edged with black. Underparts dark yellowish brown, with rather broad, deep buff lines in the centre of each feather, less distinct on flanks and abdomen. Tips of feathers of under tail-coverts chestnut. Bill: maxilla blackish brown, mandible yellowish, varying in degree among individuals. Feet, black. Length, $8\frac{1}{2}$ in.; bill, $1\frac{3}{16}$ in.; wing, 4 in.; tail, $3\frac{11}{12}$ in.

Specimen described from Demarara, Brit. Guiana, in U. S., Nat. Mus., No. 84,105.

The general hue of this species beneath is rufous, occasioned by the deep buff of its throat, and stripes and spots on head, back, and lower parts. It is apparently confined to Guiana and is readily distinguished from its allies, *D. susurrans* and *D. nana*.

Dendrornis nana.

Dendrornis nana LAWR. Ibis, 1863, p. 181, ex Panama.—SALV. Proc. Zoöl. Soc. 1870, p. 193.

Dendrornis lawrencei RIDGW. Proc. U. S. Nat. Mus. Vol. X, p. 509 (1887), ex Panama.—SCLAT. Ibis, 1889, p. 353.

Dendrornis lawrencei costaricensis RIDGW. Proc. U. S. Nat. Mus. Vol. X, p. 510 (1887).—SCLAT. Ibis, 1889, p. 353.

Habitat.—Honduras, Nicaragua, Costa Rica, Panama, Colombia.

Head and nape blackish brown, each feather with an apical pear-shaped ochraceous spot, smallest on the forehead, becoming more elongated on the nape. Back brownish olive, the upper part with narrow, lanceolate dark buff stripes bordered with black; lower part of back, rump, tail and wings cinnamon-red, the wings of a rather lighter color than the tail. Throat pale buff, unspotted; cheeks pale buff, feathers edged with dark brown; underparts pale yellow-olivaceous-brown, marked conspicuously on the breast and lower part of neck with rather broad, deep buff stripes, edged with black; these stripes becoming narrower on lower breast, and nearly obsolete on flanks and abdomen. Under tail-coverts washed with rufous, more strongly defined in some specimens than in others. Maxilla dark brown, mandible yellowish, brownish at the tip. Feet blackish brown. Length, $8\frac{3}{4}$ in.; wing, $4\frac{4}{12}$ in.; tail, $4\frac{5}{12}$ in.: bill, $1\frac{3}{12}$ in.

Specimen described from Lawrence collection, No. 43,274, Am. Mus. Cat., from Panama, obtained by McLelland in 1862.

The type of this species is before me, but being in moult with the tail and wings not fully developed, I have taken another example obtained in Panama at the same time, as the type of my description. A number of specimens are before me, seventeen in all, from all the localities of which it is stated to be an inhabitant, among which are the types of *D. lawrencei* Ridgway and *D. l. costaricensis* Ridgw. From an investigation of the labels, I find the various specimens of *D. nana* have been referred to *pardalotus* Vieill. and *susurrans* Jard., sometimes to both of these species, and sometimes left undetermined. The throat entirely unspotted, easily distinguishes this species from all its near allies, and on comparison with a series of these, the different coloring of the underparts with the shape and arrangement of the spots make it readily recognizable.

I regret to place as synonyms Mr. Ridgway's species and subspecies from Panama and Costa Rica, as I can find no characters to separate them from typical *nana*. Mr. Ridgway in his descrip-

tion of *D. lawrencei* (l.c.) compares it with *D. ocellata* Spix, or, speaking more correctly, with a type specimen of *D. chunchotambo* Tschudi, which has been determined by both Sclater and Taczanowski to be be identical with *D. ocellata* Spix.* It is quite true that Mr. Ridgway's specimens are separable from the species from Peru, but that is not their nearest ally, and if the type of *nana* had been in his possession at the time he wrote his descriptions I believe he would have perceived that his birds were identically the same. The slight difference in size mentioned as distinguishing *D. lawrencei* from *D. l. costaricensis* is also to be noticed in a series of any species of this genus, and is evidently of no specific value.

Dendrornis multiguttata.

Nasica multiguttatus LAFRES. Rev. and Mag. Zool. 1850, p. 417.

Picolaptes notatus EYTON, Contr. Orn. p. 26 (1852).

Dendrornis multiguttatus LAFR. DES MURS. Cast. Voy. Amer. Sud. Ois. p. 44, Tab. xii, fig. 1 (1856).

Dendrornis multiguttata SCLAT. Cat. Am. B. p. 164, sp. 1010 (1862). SCLAT. & SALV. Proc. Zoöl. Soc. 1873, p. 271.—TACZ. Ornith. Per. Tom. II, p. 180 (1884).

Habitat.—Brazil, Fontiboa, Upper Amazon (Lafres.), Santarem (Williams). Lower Ucayali (Bartlett). Cayenne (Sclater).

Top of head, neck and back olive brown, darkest on the head, which has the central portion of the feathers striped with buffy white, becoming broader and more lengthened on the back, and of a reddish shade, and all margined with black. Rump, upper tail-coverts, wings and tail cinnamon-red. Throat buff, in one specimen the feathers indistinctly margined with brown. Entire underparts grayish olive, broadly striped with buffy-white, margined with black, the stripes becoming narrower and less distinct as they proceed towards the vent. Bill yellowish white. Feet pale brown. Total length, $7\frac{1}{8}$ in.; wing, $3\frac{3}{4}$ in.; tail, $3\frac{5}{8}$ in.; bill, 1 in.

Type specimen described, No. 2269, Coll. Bost. Soc. Nat. Hist.

Several specimens are before me, among which is Lafresnaye's type. It is one of the smallest species of the genus and cannot be confounded with any other of those that I have seen. Sclater (l.c.) gives it as from Cayenne, but all the specimens I have met with are from Brazil. Of three specimens obtained at Santarem on the Amazon, one agrees in all respects with the types and was procured on July 30. The other two were shot in June,

* See my remarks on *D. ocellata.*

and instead of being grayish olive beneath, are of a decided reddish shade, and are also reddish brown on the back. In size, shape and distribution of markings, and in general dimensions, however, they agree with the July specimen, and probably merely represent a reddish phase of plumage, which I have noticed occurs sometimes with other species of the genus.

I place *Picolaptes notatus* Eyton (l.c.) as a synonym of this species, as Sclater says (P. Z. S., 1873, p. 372) he has compared the type with *D. multiguttata* Lafres. and decided it to be the the same.

Dendrornis chunchotambo.

Dendrocolaptes chunchotambo TSCHUD. Faun. Peruv. p. 241, Tab. xxii, fig. 1 (1844-46). LAFRES. Rev. Mag. Zool. 1850, p. 281.—SCLAT. Proc. Zoöl. Soc. 1871, p. 86.

Dendrornis peruviana LAFRES. MS.

Nasica chunchotambo LAFRES. Rev. Mag. Zool. 1850, p. 421.

Dendrornis ocellata PELZ. Ornith. Bras. p. 45 (1868).—TACZ. Ornith Per. Tom. II, p, 179 (1884).—SCLAT. & SALV. Proc. Zoöl. Soc. 1867, pp. 575, 751, 1873, p. 271.

Dendrornis palliata SCLAT. Cat. Am. B. p. 164 (1868).—SCLAT. & SALV. Proc. Zoöl. Soc. 1873, p. 271.

Dendrornis weddelli SCLAT. Proc. Zoöl. Soc. 1871, p. 86. (nec LAFRES).

Habitat.—Peru (Tschudi) Xeberos. Eastern Peru (Bartlett).

Crown of head and nape brownish black, with small, apical, pear-shaped buff spots on each feather, slightly larger on the nape than on the forehead. Back yellowish brown, each feather having a narrow, central buff line. Cheeks dark brown, striated with narrow yellowish white lines. Chin whitish, uniform. Throat pale buff, each feather bordered with blackish brown. Under parts yellowish brown but lighter than the back. Upper part of breast covered with elongated buff spots, broadest at their apical portion, and bordered with blackish brown. The spots on lower breast, abdomen and flanks are also buff, but narrower and much longer, and become almost obsolete on the vent and lower tail-coverts. Wings, rump and tail, chestnut; apical portion of inner webs of primaries purplish brown. Bill yellowish brown. Feet blackish brown. Length, $7\frac{5}{8}$ in.; wing, 4 in.; tail, $3\frac{9}{10}$ in.; bill, $1\frac{1}{10}$ in.

Described from a specimen obtained by Tschudi in Peru (now in U. S. Nat. Mus., No. 41,918), and identified by Sclater in his own handwriting as the same as *D. ocellata* Spix.

There are three specimens in Lafresnaye's collection, bearing the MS. name of *D. peruviana*, but without any locality given

on the labels. I consider them to be the same as Tschudi's specimen from Peru; the only difference I can see between them is that the throat of Tschudi's bird is somewhat paler. As the various species of this genus exhibit examples that vary from the typical style both in coloration of plumage, and in general measurements, it does not appear to me wise to consider these specimens of Lafresnaye, on account of the slight difference shown, as specifically distinct from the species described by Tschudi.

I have included among the synonyms, *D. weddelli*, mentioned by Sclater (l.c.), as I gather from his remarks that he considers it the same as *D. ocellata* Spix. Judging from the type of *D. weddelli*, and the typical example of *D. chunchotambo* Tsch. referred to by Sclater as belonging to the Smithsonian Institution, both of which are before me; the two represent entirely distinct species.

Dendrornis elegans.

Dendrornis elegans PELZ. Orn. Bras. pp. 45, 63 (1868).—TACZ. Ornith. Peru, Tom. II, p. 178 (1884).

Habitat. — Engenho do Gama, Manaqueri, Brazil (Natterer). Peru, Chamicuros (Bartlett), Yurimaguas (Stolzmann).

"D. pileo nuchaque nigrescentibus, maculis guttæformibus parvisochraceis, dorso fusco olivaceo maculis ochraceis conformibus sed multo majoribus postice nigro limbatis, uropygio caudaque cinnamomeo rufis, tectricibus alarum minoribus, mediis et majorum pogonio externo, marginibusque primariarum fusco olivaceis, plumis humeralibus, remigibus primariis excepto apice nigricante, reliquis totis cinnamomeo rufis, plumis auricularibus nigriscentibus ochraceo striatis, gula flavo albida, plumarum marginibus obscuris plus minusve conspicuis, juguli et pectoris plumis basi griseo olivaceis, scapo et macula terminali triangulari obscure marginata ochraceis, his maculis in jugulo contiguis et squamæformibus, in pectore rarioribus haud contiguis, abdomine fere unicolore ochraceo olivaceo maculis vix conspicuis, rostro compresso subrecto, culmine parum deflexo, gonyde fere recta, maxilla et apice mandibulæ obscure corneis, mandibula reliqua cœrulescente cinerea. Longit. (specim. exsiccat.) 8-8½″, alæ 3″ 7-11‴, caudæ 3″-3″ 5‴, rostri 11‴-1″, a rictu 16-17.‴"

The above is Pelzeln's description of the type. I have not seen any specimen of this species.

Dendrornis spixi.

Dendrocolaptes tenuirostris SPIX. Av. Bras. p. 88, Tab. 91, fig. 2 (1824) (nec LICHT.).

Picolaptes spixi LESS. Trait. Ornith. p. 314 (1831).

Dendrornis psixi PELZ. Orn. Bras. p. 45 (1868).

Habitat.—Para. Brazil (Pelzeln).

"Minor, castaneus; rostro cylindrico, arcuato; gula brevipenni immaculate fulva; capite fulvo-ocellato; occipite albido-maculato; nucha, collo, pectore abdomineque oblonge et latissime fulvo-maculatis; macula auriculari periopthalmiisque fulvis, nigro-variegatis; canda lœte rufa."

"Descriptio. Corpus præcedente (*D. ocellatus*) nonnihil minus; caput fuscum, ocellatum; dorsum corpusque subtus olivaceo-rufescentia, albo large strigilata; tectrices alarum olivaceo-castanea; remiges castaneæ, vexillo interno nigricante; rostrum supra fuscum, subtus flavidum; pedes cœrulescentes. Longitudo corporis $6\frac{1}{4}'$, cauda 2 1-2′, c. alis l. $1\frac{1}{2}'$, rostri 1′."

The above are Spix's descriptions from the type. I have not seen any specimens of this species.

Dendrornis palliata.

Dendrornis palliatus DES MURS, Voy. Amer. Sud. Ois. p. 46, pl. 15 fig. 1 (1856).

Dendrornis palliata SCLAT. & SALV. Proc. Zoöl. Soc. 1866, p. 184.

Habitat.—Lower Ucayali (Bartlett).

"D. suprà cinnamomeo brunneiis; subtus brunneo-olivaceus; capite brunneo-nigrescente, fulvo-albido flammato; collo postico tergoque concoloribus, singulis flammulis nigro circumdatis; uropygio, alis caudâque cinnamomeo rubris; primariis apice nigrescentibus; mento gulâque fulvo-albidis; pectore abdomineque fulvo-albido squammatis, singulis maculis nigro lateraliter marginatis. Rostro corneo. Pedibus brunneis."

"Dessus du corps d'un brun olivâtre; tête d'un brun noirâtre piqueté de flammèches de fauve blanchâtre; chaque flammèche encadrée de noir. Croupion, ailes et queue, d'un brun rouge cannelle foncé; les primaires terminées de brun noirâtre; menton et gorge d'un blanc teinté de fauve; l'estomac largement maculé de blanc fauve; chaque plume de cette couleur encadrée de noir. Ventre flammécheé de taches de même teinte beaucoup moins apparentes. Bec couleur de corne jaunâtre. Pieds brun. Longueur totale 19 centimètres—du bec, $2\frac{1}{2}$;—du tarse, 2;—de la queue, $7\frac{1}{2}$."

The above is Des Murs's description of the type. I do not know the species.

Dendrornis flavigaster.

Xiphorhynchus flavigaster SWAIN. Phil. Mag. Vol. I, p. 440 (1827).

Dryocopus eburneirostris LESS. Echo. Mond. Sav. (1843).—DES MURS, Icon. Ornith. pl. 52 (1849).

Dryocopus flavigaster DES MURS, Icon. Ornith. Text. (1849).
Dendrornis eburneirostris SCLAT. Cat. Am. B. p. 164, sp. 1011 (1862).—BOUC. Proc. Zoöl. Soc. 1883, p. 450.
Nasica flavigaster LAFR. Rev. Mag. Zool. 1850, p. 283.
Dendrornis mentalis LAWR. Ann. Lyc. N. Y. Vol. VIII, 1867, p. 481.

Habitat.—Mexico, Yucatan, Guatemala, Honduras, Nicaragua, Costa Rica.

Top of head and nape black; the centre of each feather with a pale buff stripe, widest at the tip, very small on the forehead, where it is merely an apical spot, larger and broader on the nape. Back light rufous, with broad pale buff or buffy white stripes margined with black. Rump and upper tail-coverts cinnamon, darkest on tail-coverts. Wings cinnamon, tail cinnamon-red, considerably darker than the wings. Throat buffy white without spots in adults; in some specimens the feathers of lower part of throat are edged with dark brown. Underparts grayish olive with conspicuous broad, pale buff stripes margined with black, largest and most numerous on upper part of breast, becoming narrower on flanks and lower part of breast and indistinct on abdomen and vent. On either side of throat is a more or less distinct black line sometimes extending from base of mandible to lower part of the throat, in other examples again only seen on a portion of the lateral part of the throat. Bill white, dark brown in some specimens on the basal portion. Feet brownish black.

Description taken from an example from Orizaba, No. 31,737, Museum Comparative Zoölogy, Cambridge, Mass. Total length, $10\frac{1}{8}$ in.; wing, $4\frac{5}{8}$ in.; tail, $4\frac{3}{4}$ in.; bill, $1\frac{5}{8}$ in.

Other specimens vary as follows: Wing, $4\frac{1}{2}$—4 in.; tail, $4\frac{5}{8}$—$3\frac{7}{8}$ in.; bill, $1\frac{1}{2}$—$1\frac{1}{8}$ in.

Sixty specimens of this species are before me from nearly all the localities in which it is stated to dwell, among them being the types of Lafresnaye's *D. albirostris*, a MS. name, and Lawrence's *D. mentalis* from Mazatlan. The latter is a light colored specimen, that is possibly seasonal, as other specimens from Mazatlan* are as dark colored as those from various other localities, and it is impossible to separate them from specimens obtained at Orizaba, and Tampico in Mexico, and other places in Guatemala, Honduras, etc. The stripes on the back vary in width in different specimens, even from the same locality, and this has no specific value, and I can perceive nothing in the large series at my command to indicate that there is more than one species of this form.

* Specimen 58,237, National Museum, from Mazatlan. Back olivaceous brown. Stripes rusty buff.

In order to exhibit more clearly the variation that exists in the extreme length of the wing, I give here a list of forty-four specimens from various localities, with the measurements of the wing taken from the carpal joint to extreme point of primaries. It will be seen that the longest wing measures $4\frac{3}{4}$ inches and the shortest $3\frac{7}{8}$, a difference of $\frac{7}{8}$ of an inch. The specimens with the longest wings come from Tehuantepec, and those with the smallest from Mazatlan and Guatemala. But there are examples from Tehuantepec with a wing measurement of $4\frac{3}{8}$ inches, showing a difference from its larger relative of $\frac{3}{8}$ inch, and from Mazatlan there are specimens with wings $4\frac{1}{2}$ inches in length, or a difference in birds from that locality of $\frac{5}{8}$ inch. In Mazatlan and Tehuantepec these extremes are exhibited in different sexes, the female being the smaller, but examples from Orizaba show the male to have a wing of $4\frac{1}{4}$ inches and the female of $4\frac{5}{8}$ inches. Honduras also shows a male with a wing $4\frac{3}{8}$ inches long, and a female with one $4\frac{1}{2}$ inches, so it cannot be said that the difference of measurement is sexual; nor is it of any value, as already stated, for a specific character.

			Wing.
♀ 663,	Sennett Coll.	Tampico.	$4\frac{1}{2}$ in.
♀ 583,	" "	"	$4\frac{3}{4}$ in.
♀ 584,	" "	"	$4\frac{5}{8}$ in.
♀ 568.	" "	"	$4\frac{1}{2}$ in.
— 28859,	National Museum.	Mazatlan.	$4\frac{3}{8}$ in.
♀ 50788,	" "	"	$3\frac{7}{8}$ in.
♂ 50787,	" "	"	$4\frac{1}{2}$ in.
♂ 3450,	" "	"	$4\frac{1}{2}$ in.
— 58238,	" "	"	$4\frac{1}{4}$ in.
— 51479,	" "	"	$4\frac{1}{2}$ in.
— 58237,	" "	"	$4\frac{5}{8}$ in.
♂ 30134,	" "	"	4 in.
♂ 43272,	Amer. Mus. Nat. Hist., N. Y.	"	$4\frac{5}{8}$ in.
— 43258,	" " " " "	Jalapa.	$4\frac{5}{8}$ in.
♂ ——,	Sennett Coll.	Vera Cruz.	$4\frac{5}{8}$ in.
— 38187,	National Museum.	Orizaba.	$4\frac{1}{2}$ in.
♂ 31738,	Mus. Comp. Zoöl. Cambridge.	"	$4\frac{1}{4}$ in.
♀ 31737,	" " " "	"	$4\frac{5}{8}$ in.
♂ 41626,	National Museum.	Cordova.	$4\frac{3}{8}$ in.
♂ ——,	Sennett Coll.	Manzanillo.	$4\frac{1}{8}$ in.
— 57608,	National Museum.	Tehuantepec.	$4\frac{3}{4}$ in.
♂ 58901,	" "	"	$4\frac{3}{4}$ in.
♂ 57615,	" "	"	$4\frac{5}{8}$ in.

♂ 57614,	National Musenm	Tehuantepec.	$4\frac{3}{4}$ in.
♀ 57613,	" "	"	$4\frac{5}{8}$ in.
♀ 59598,	" "	"	$4\frac{3}{8}$ in.
♀ 51609,	" "	"	$4\frac{3}{8}$ in.
— 106293,	" "	Yucatan.	$4\frac{5}{8}$ in.
♂ 106292,	" "	Temax.	$4\frac{5}{8}$ in.
♂ 39241,	" "	Merida.	4 in
— 50533,	" "	Guatemala.	$4\frac{3}{8}$ in.
— 603278,	" "	"	$4\frac{1}{4}$ in.
— 30765,	" "	"	$4\frac{1}{8}$ in.
— 42700,	" "	"	$4\frac{1}{8}$ in.
— 30766,	" "	"	4 in.
— 28028,	Amer. Mus. Nat. Hist., N. Y.	"	$3\frac{7}{8}$ in.
— 43260,	" " " " "	"	$4\frac{1}{4}$ in.
— 43257,	" " " " "	"	$3\frac{7}{8}$ in.
— 43259,	" " " " "	"	$4\frac{3}{8}$ in.
— 28127,	" " " " "	"	$3\frac{7}{8}$ in.
— 28128,	" " " " "	"	4 in.
♂ 112554,	National Museum.	Truxillo, Honduras.	$4\frac{3}{8}$ in.
♂ 112583,	" "	" "	$4\frac{3}{8}$ in.
♀ 90921,	" "	Sucuya, Nicaragua.	$4\frac{1}{2}$ in.
♂ 90922,	" "	" "	$4\frac{1}{4}$ in.

Dendrornis lacrymosa.

Dendrornis lacrymosa LAWR. Ann. Lyc. Nat. Hist. Vol. VII, p. 467 (1862).—SALV. Proc. Zoöl. Soc. 1870, p. 193.—SCLAT. & SALV Proc. Zoöl. Soc. 1879, p. 523.

Habitat.—Costa Rica, Panama, Colombia (Truando, Schott). Antioquia (Salmon).

Top of head, back, small and middle wing-coverts black, centre of each feather covered by a pale fulvous spot, pear-shaped and quite small on the head, increasing in size from the forehead, and becoming quite large and broadly elongated on the back. Larger wing-coverts bright rufous, with a broad black stripe on the edge of the outer web. Lower part of back, rump, and upper tail-coverts, wings and tail, dark cinnamon-red. Throat, buffy white. Sides of head pale buff streaked with blackish brown. Neck in front, and breast pale buff, each feather margined with black. Flanks, abdomen and lower tail-coverts dark grayish-brown striped with pale buff, margined with blackish brown. Maxilla blackish brown, base of mandible pale yellow. Feet dark brown. Total length, $9\frac{1}{2}$ in; wing, $4\frac{3}{4}$ in.; tail, $4\frac{5}{8}$ in.; bill, $1\frac{3}{8}$ in. Ex Type, Coll. Am. Mus. Nat. Hist., N. Y.

In some specimens the throat is deep buff with a tinge of rufous on the abdomen and lower tail-coverts. Apparently younger birds have the underparts white tinged with buff, the feathers margined with dark brown.

Dendrornis polysticta.

Dendrornis polysticta SALV. & GOD. Ibis, 1883, p. 210.—SALV. Ibis, 1885, p. 422.—REICH. & SCHOL. Jour. für. Ornith. 1885, p. 91.

Habitat.—Bartica Grove, British Guiana (Whiteley).

"Supra brunnea, capite summo nigricante, uropygio, alis et cauda ferrugineis; capite summo, cervice et interscapulio cervino guttatis, guttis singulis nigro marginatis; subtus gutture cervino, pectore et abdomine toto brunnescentibus, illo guttis cervinis nigro marginatis notato; rostri maxilla nigricante, mandibula interdum nigricante interdum ad basin flavicante, pedibus corylinis; long tota 8.5, alæ 4.0, rostri a rictu 1.5, tarsi 0.9."

"Obs. D. lacrymosæ affinis, sed guttis supra et subtus minoribus, abdomine imo fere immaculato et tectricibus alarum brunneis diversa."

The above are Salvin and Godman's description and observations. I have not seen the species.

Dendrornis eytoni.

Dendrocolaptes eytoni SCLAT. Proc. Zoöl. Soc. 1853, p. 69.
Dendrornis eytoni SCLAT. Cat. Am. B. p. 165, sp. 1013 (1862).—SCLAT. & SALV. Proc. Zoöl. Soc. 1867, p. 575.
Dendrornis eytonii PELZ. Ornith. Bras. p. 45 (1868).

Habitat.—Brazil, Capin River, Lower Amazon, Para (Wallace), Santarem (Riker).

Head and nape black with central pale buff spots. Lower part of neck and back dark olive brown, centre of feathers with broad buff stripes margined with black, the stripes becoming narrower towards the middle of the back. Lower part of back, wings, rump, upper tail-coverts and tail cinnamon, the tail darker than the wings, and ends of primaries dark brown. Throat white, upper part of breast and sides dark brown with broad, large, buffy white spots margined with black. Abdomen and under tail-coverts fulvous, obscurely striped with pale buff. Bill black. Feet black. Total length, $9\frac{3}{8}$ in.; wing, $4\frac{3}{8}$ in.; tail, $4\frac{5}{8}$ in.; bill, $1\frac{3}{8}$ in. Description from an example from Santarem, Brazil, Coll. C. B. Riker.

Dendrornis d'orbignyanus.

Nasica d'orbignyanus PUCH. & LAFRES. Rev. Mag. Zool. 1850, p. 420, ex Peru.

Habitat.—Bolivia, Guarayos, Chiquitos, a Dom. d'orbigny altatus (Puch. & Lafres.). Peru? (Lafres.). Brazil, Matto Grosso (Smith).

Crown black, centre of feathers with lengthened pear-shaped pale buff spots. Back of neck and upper part of back olivaceous brown with a reddish tinge, and with a central buff stripe on each feather. Lower part of back and upper tail-coverts cinnamon-red. Wings and tail cinnamon-red, the tail being a darker shade. Throat pale buff. Underparts olivaceous brown with a reddish tinge, and striped with pale buff; these stripes broadest on upper part of breast, growing narrower as they descend and becoming nearly (in some specimens, quite) obsolete on the abdomen. Bill yellowish white. Feet black. Total length, about $9\frac{3}{4}$ in.; wing, 5 in.; tail, $4\frac{1}{4}$ in.; bill, $1\frac{1}{2}$ in.

Description taken from a specimen in the collection of the Academy of Natural Sciences of Philadelphia from Chiquitos, the locality of Lafresnaye's type.

This species is apparently distinct from the other members of *Dendrornis* from the fact, that the buff stripes on neck, upper part of back, and underparts are not margined with black. No other species is known so far as I am aware, that has not these spots or stripes margined with black, upon some one or other portion of the back or underparts. This character is especially emphasized by its describer, who states that "*ses flammettes ne sont nullement circonscrites de noir ou de noirâtre sur les parties anterieures et sur le dos.*"—Five specimens are before me, which I assign to this species, three of them are from the collection of the Philadelphia Academy of Sciences, and two from Matto Grosso in the collection of the American Museum of Natural History in New York. One of these last, No. 33,650, has on two of the feathers of the neck, a narrow black margin to the central buff stripe, but the other, No. 33,649, is entirely without black margins. The underparts on all the examples are more olivaceous than those of specimens of either *D. rostripallens* or *D. guttata*, which have a very decided reddish tinge. In a large series of specimens it would not be unlikely, I think, to find some with more or less black margins to the buff stripes on the *back*, but the fact that these stripes on the entire underparts are without these black margins readily distinguishes *d'orbignyanus* from *rostripallens*, which has the breast stripes margined with black, and from *guttata*, which has all the stripes on the underparts margined in the same manner.

The authors of this species, after their description, give its habitat as "Guarayos, Chiquitos," and at the end of the remarks, it is said "Le d'orbignyanus est du Pérou." As Chiquitos lies to the east of the Andes in Bolivia, it is evident that there is some confusion here. I have seen no Peruvian specimens.

Dendrornis rostripallens.

Dendrornis rostripallens LAFRES. MS. DES MURS, Voy. Castel. Amer. Sud Ois. p. 45, pl. 12, fig. 2 (1856), ex Upper Amazon.—PELZ. Ornith. Bras. p. 45 (1868);—*ibid.*, Proc. Zoöl. Soc. 1882, p. 27.—TACZ. Ornith. Per. Tom. II, p. 176 (1884).

Dendrornis pardalotus SCLAT. Cat. Am. B. p. 164, No. 1007 (1862), nec. VIEILL.

Dendrornis guttata TACZ. Proc. Zoöl. Soc. 1874, p. 529 (nec LICHT.).—SCLAT. & SALV. Proc. Zoöl. Soc. 1879, p. 622 (nec. LICHT.).

Habitat.— Colombia, Ecuador, Sarayacu (Buckley). Brazil, Matto Grosso (Smith).

Crown and nape blackish brown, spotted with buffy white, the spots on the crown pear-shaped, on the nape elongated. Back yellowish brown, central portion of feathers pale buff, this color disappearing on centre of back. Rump and upper tail-coverts cinnamon-red. Chin white, throat deep buff, unspotted. Lower parts pale yellowish brown, inclined to reddish buff on the abdomen, conspicuously striped with deep buff, the stripes, on upper part of breast only, margined with black. These buff stripes usually become obsolete on lower abdomen and vent, although in some specimens they are faintly visible. Wings cinnamon. Tail very dark chestnut. Bill, pale horn-color; in some examples, however, the lateral basal portion of the maxilla is blackish brown. Feet black. Length, $10\frac{1}{2}$ in. to 9 in.; wing, $4\frac{10}{12}$ to $4\frac{4}{12}$ in.; tail, $4\frac{11}{12}$ to 4 in.; bill, $1\frac{7}{12}$ to $1\frac{3}{12}$ in.

The above measurements are taken from a series of nine specimens and show the extremes.

In his description of the type of this species, Lafresnaye makes no mention of any black margins to the buff stripes upon the breast, and if the type does not possess these it is questionable if the birds generally assigned to *rostripallens* do not really represent some other form, as all writers describe them as having these stripes margined with black. The figure given by Des Murs does not satisfactorily indicate whether these black margins exist or not. However, I am led to believe that this was an oversight on the part of the describer of the species, since all the examples of

'*rostripallens*' from Lafresnaye's collection have the buff stripes on the upper part of the breast margined with black. An examination of the type, which is probably in the Paris Museum, is necessary to decide this point. I include among the synonyms, *D. pardalotus* given by Sclater in his 'Catalogue of American Birds', as one of the specimens contained in the Lawrence Collection is labelled in Sclater's handwriting, "*Dendrornis pardalotus*, Vieill. of my Cat. P. L. S."

The bills of the various specimens before me vary considerably, not only in color, as already noticed, but also in size, and this occurs in examples from the same locality.

Dendrornis guttata.

Dendrocolaptes guttatus LICHT. Abhandl. Königl. Akad. Wissens. Berl. 1818, p. 201; *ibid.* Verz. Doubl. Zool. Mus. Berl. p. 16, no. 149 (1823).

Dendrornis guttata PELZ. Ornith. Bras. p. 45 (1868).

Habitat.—Brazil, Bahia.

Upper part of head blackish brown, each feather with a small, pear-shaped dark buff spot tipped with black. Back olive brown with reddish tinge, with elongated dark buff stripes bordered with black, these stripes becoming narrower towards the lower part of the back. Lower part of back and upper tail-coverts cinnamon-red. Throat deep rusty buff. Underparts rusty buff, conspicuously striped with reddish buff, all the stripes margined with black. On the abdomen these stripes have a reddish tinge. Wings dark cinnamon; exposed portions of primary coverts olivaceous. Tail dark chestnut. Under tail-coverts in some specimens have a rufous tinge. Bill has the maxilla dark brown, paler on the culmen; mandible yellowish. Feet brownish black. Length, $9\frac{3}{4}$ in.; wing, $4\frac{3}{4}$ in.; tail, $4\frac{3}{8}$ in.; bill, $1\frac{3}{8}$ in. Specimen described, No. 43,270, Am. Mus. Nat. Hist., Lawr. Coll.

This species is very nearly allied to *D. rostripallens* Lafr., and a question arises in my mind if they should really be regarded as distinct. The chief difference seems to be that the buff stripes on the underpart of the body in *guttata* are margined with black even upon the abdomen, while such margins in *rostripallens* are restricted to the upper part of the breast. It appears to be a rather fine distinction, and can only be ascertained to be reliable from the examination of a large series of specimens. Unfortunately I have not been able to procure many examples from

Bahia, the locality from which the type came, but I doubt, with ample material to enable an opinion to be formed, whether the two forms could be kept apart. Of course if they should be proved to be but one species, *rostripallens* with its synonymy would have to be included under the much older name of *guttata*.

Dendrornis guttatoides.

Nasica guttatoides LAFRES. Rev. Mag. Zool. 1850, p. 387, ex Colombia.
Dendrornis guttatoides DES MURS. Voy. Castel. Ois. p. 43, pl. xiii, fig. 2 (1856).—SCLAT. Cat. Am. B. p. 164, sp. 1008 (1862).—SALV. Ibis, 1885, p. 422.

Habitat. Colombia (Lafres.), Cayenne (Sclater), Bartica Grove, British Guiana (Whiteley).

Top of head and back of neck, black, with central pale buff spot on each feather, more elongated on the neck. Back reddish brown with rather broad central deep buff stripes, bordered with black; these stripes becoming narrower on lower part of the back. Rump and upper tail-coverts dark cinnamon-red. Cheeks pale buff streaked with dark brown. Throat whitish buff, uniform. Underparts dark olive brown, reddish on the centre of abdomen, vent and under tail-coverts, each feather with a broad central streak bordered with black, these streaks whitish buff on the breast, becoming brighter and reddish on the abdomen, and indistinc, towards the vent. Wings and tail dark cinnamon. Bill short, dark brown, paler on basal half of mandible. Feet, horn brown. Total length $9\frac{1}{4}$ in.; wing, $4\frac{1}{2}$ in.; tail, $4\frac{3}{8}$ in.; bill, $1\frac{1}{2}$ in. Type described, No. 2258, Coll. Bost. Soc. Nat. Hist.

The above description is taken from Lafresnaye's type, which he states in the 'Revue et Magasin' (l. c.), as having been bought from a dealer with some other birds from Colombia. It was also obtained by Castelnau at Lorette. The type represents a very strongly marked and well defined species, not in any way resembling the *D. guttata* with which its describer compared it. The entire underparts are conspicuously covered with broad buff stripes, and the bill, which perhaps is the strongest character, is very short and stout for the size of the bird. Oudart's figure in Des Murs's work gives no idea whatever of its appearance. The type is a fine specimen, and in perfect preservation.

Dendrornis triangularis.

Nasica triangularis LAFRES. Rev. Zool. 1842, p. 134; *ibid.*, Mag. Zool. Ois. pl. 32 (1843); *ibid.*, Rev. et Mag. Zool. 1850, p. 418.

Dendrornis triangularis SCLAT. Cat. Am. B. p. 165, sp. 1014, (1862).—SCLAT. & SALV. Proc. Zoöl. Soc. 1879, p. 622.—TACZ. Ornith. Pèr. Tom. II, p. 177 (1884).

Habitat. Colombia, Ecuador, Peru, Ray-Urmana (Stolzmann), Bolivia, Simacu, Prov. Yungas (Buckley).

Top of head and nape blackish, each feather with a lengthened central buffy white spot. Back bright olive, with a few narrow buffy white lines on the upper part. Upper tail-coverts cinnamon. Throat yellowish white, varying in depth of shade, each feather with an apical blackish brown margin. Entire underparts dark olive thickly covered with yellowish white triangular spots placed at the end of each feather. In some specimens these spots are rounded at the end instead of being of a triangular shape. Wings pale cinnamon, with the edges of the outer webs of all the feathers bright olive. Tail dark cinnamon brown. Bill blackish at the base, yellowish white for the remaining part. Feet, olive brown. Total length, 8⅛ inches.; wing, 4½ in.; tail, 4⅛ in.; bill, 1⅛ in. This description is from the type specimen, No. 2276, Coll. Bost. Soc. Nat. Hist Other specimens vary in their measurements as follows: Wing, 4⅜ to 4⅝ in.; tail, 4⅜ to 4⅝ in.; bill, 1¼ to 1½ in.

There are three types of this species from the Lafresnaye collection before me, two of which are *D. triangularis*, and the third is *D. erythropygia* Sclat. Whether this last came from Colombia with the others, I have no means of ascertaining, as no locality was given upon any of Lafresnaye's types. That author evidently did not perceive that he had two allied species in his possession. There is no doubt, however, which of the three specimens Lafresnaye considered as *triangularis*, as his description and figure, poor as the latter is, point conclusively to the bird without the cinnamon rump, and with the throat feathers margined with a dark line and not spotted.

Dendrornis erythropygia.

Dendrornis triangularis SCLAT. Proc. Zoöl. Soc. 1856, p. 289 (nec LAFRES.).

Dendrornis erythropygia SCLAT. Proc. Zoöl. Soc. 1859, p. 366.—SALV. Proc. Zoöl. Soc. 1870, p. 193.

Dendrornis erythropygia æquatorialis BERLEP. & TACZ. Proc. Zoöl. Soc. 1883, p. 563.—REICH. & SCHAL. Jour. für. Ornith. 1886, p. 91.

Habitat.—Mexico, Jalapa (De Oca), Guatemala, Costa Rica, Veragua (Salv.), Panama (Lion Hill, near Aspinwall, McLeannen), Chimbo, Ecuador (Stolzmann).

Top of head and nape olive brown, each feather with a small apical light buff spot and a terminal blackish brown margin. Back olive brown each feather with a conspicuous, rather elongated, buffy white spot near the tip. Lower back and upper tail-coverts cinnamon-red. Throat ochraceous, with a small dark olive spot at the tip of each feather, these spots becoming terminal bars on the lower part of the throat. Entire underparts dark olive, with a large pale yellow ovate spot at the tip of each feather. Wings and tail cinnamon, the tail slightly the darker in coloring. Bill: maxilla dark brown; mandible yellowish white. Feet black. Total length, $9\frac{5}{8}$ in.; wing, $4\frac{3}{4}$ in.; tail, $4\frac{7}{16}$ in.; bill, $1\frac{1}{4}$ in. Ex Jalapa, Sp. Other examples vary as follows: wing, $4\frac{5}{8}$ to 4 in.; bill, $1\frac{1}{4}$ to 1 in.

The range of this species, as defined by some writers, seems peculiar. It goes from Mexico on the north (the type and the bird above described both having been procured at Jalapa) through Guatemala, possibly Honduras and Nicaragua, although I have not seen specimens from those countries, and the Isthmus of Panama, whence thoroughly typical specimens were obtained by McLeannen. The typical form does not seem to be found in Costa Rica. It is apparently very distinct from *D. triangularis*, and it is somewhat surprising that so keen an ornithologist as Lafresnaye should not have perceived that he had two species before him.

Dendrornis punctigula.

Dendrornis punctigula RIDGW. Proc. U. S. Nat. Mus. Vol. XI, p. 544 (1888).—SCLAT. Ibis, 1889, p. 352.

Habitat.—Costa Rica, Colombia, Truando (Schott).

The only difference I can see between specimens from Costa Rica and those of *D. erythropygia* from all localities, is that the back is nearly uniform in its coloration with narrow whitish yellow stripes on the upper portion instead of the conspicuous spots seen on Sclater's species. My material is not sufficient (I have only eleven specimens from Costa Rica), to enable me to determine the value of the claim that this bird represents a distinct species. The fact that it is apparently surrounded by *D. erythropygia* on the north and south, and that it also appears in Colombia, as I have a specimen of the Costa Rican form from Truando collected by Schott, would seem to indicate that it

would be extremely difficult to arrange in any satisfactory manner the geographical distribution of the two forms, and I think it not unlikely that with a good series of examples the two would run into each other without leaving any definable line of separation. Mr. Ridgway refers this bird from Truando in his article on *D. punctigula* (l.c.), to *D. erythropygia* Sclat., but as it has no spots on the back, merely a few pale yellow lines, it is undoubtedly the same as the Cost Rica bird. Mr. Ridgway's identification may, however, eventually prove to be correct. At all events the bird from Costa Rica separated by Mr. Ridgway is not restricted to that country, as is shown by the Truando specimen. It remains therefore for some one with better material at hand than I at present possess, to fix the status of the form called *D. punctigula*.

Dendrornis obsoletus.

Dendrocolaptes obsoletus ILLIG. LICHT. Abhand. Königl. Akad. Wissens. 1818, p. 205, No. 10.— LICHT. Berlin, Abhand. 1819, p. 203, 1821, p. 265.
Picolaptes obsoletus LAFRES. Rev. Mag. Zool. 1850, p. 371.
Nasica obsoletus LAFRES. Rev. Mag. Zool. 1850, p. 423.

Habitat.—Para, Brazil.

"Rostro recto, valde compresso, cultrato, albicante, gulâ maculisque guttata capitis, colli, dorsi et pectoris sordide albo-flavescentibus; digitis pro mole tenerrimis; gonyde porrecta, culminis apice sensim deflexo. Longit. tota, 8 pollices."

I do not know this bird.

RECENT LITERATURE.

Salvin and Godman's Biologia Centrali-Americana—Aves.*—Volume I of this great work, the first signature of which bears date of September,

* [Temporary Titlepage.] | Biologia | Centrali-Americana. | —— | Aves. | Vol. I. | By | Osbert Salvin, M. A., F. R. S., &c., | and | Frederick DuCane Godman, F. R. S., &c. | == | 1879-1887.

For a previous notice of this work (Parts I-X) see Bulletin Nuttall Ornithological Club, Vol. VI, No. 3, July, 1881, pp. 174-176.

1879, and the last that of April, 1887, has been issued. It is a large quarto of 512 pages of text, illustrated by 35 beautiful hand-colored plates* by Keulemans, the well-known ornithological artist and illustrator of Dresser's 'Birds of Europe' and others of the more recent high-class European bird books. The classification adopted is that of Sclater and Salvin's 'Nomenclator Avium Neotropicalium' (1873), and the geographical field that embraced between the United States-Mexican boundary on the one hand and the Isthmus of Panama on the other, or the continental part of that portion of the western hemisphere designated by Professor Baird, in his 'Review of American Birds' (1864-66), 'Middle America.'

Volume I of the 'Biologia' includes the whole of the Oscines, and is the only single and approximately complete work in existence on the special subject to which it pertains. The high reputation of the authors is of itself a sufficient guarantee that their task has been intelligently and thoroughly performed, and has resulted in a grand work which is absolutely indispensable to students of New World ornithology, highly useful to those who labor in other geographical fields, and must long remain the standard authority on the birds of Central America.

As was to be expected from the character of their previous writings on the same subject, the authors of the 'Biologia' treat their subject from the conservative standpoint to which English naturalists, for the most part, still adhere; and it is the natural sequence of this method, but more especially the unfortunate adoption of the purely binomial system of nomenclature, which affords most of the grounds for criticism; the very great importance of the work rendering such defects highly conspicuous. It would have been better had the authors followed, to some extent at least, the rulings of the 'Committee on Species and Subspecies' of the American Ornithologists' Union regarding the status of certain 'Nearctic' forms which have been so carefully investigated with the aid of large series of specimens on this side of the Atlantic, instead of depending on their own limited, and often misleading, material. In all probability, however, the remaining portion of the work will be less marred by errors of this kind, since Mr. Henshaw's fine collection has been transferred to the British Museum, where it can readily be compared with that belonging to the authors of the 'Biologia,' also, we understand, to be deposited there as each group is worked up.

We have already remarked that the comparatively few defects of the work are chiefly the direct result of adherence to the binomial system, "pure and simple," of nomenclature. When this is strictly followed, the finest discrimination and soundest judgment can hardly prevent inconsistent rulings as to rank of forms, some subspecies being elevated to specific rank, and others degraded to mere synomyms. Instances of this sort in Vol. I of the 'Biologia' are not numerous, but there are enough to be regretted; and since most of them affect forms belonging to the North American

* While these illustrations are eminently satisfactory from an artistic point of view, they might have been more accurate ornithologically.

fauna we may as well give a list of them: *Turdus auduboni* and *T. swainsonii* are ranked as species, distinct from *T. pallasii* and *T. ustulatus* (both of which are also given), as are also *Vireo cassini* and *V. plumbeus; Pyranga cooperi* is recognized as specifically distinct from *P. æstiva; Melospiza montana* and *M. heermanni* are also regarded as species, the latter, by the way, being not *M. heermanni* but *M. fasciata mexicana*, one of the most strongly marked of the many geographical forms into which *M. fasciata* has become differentiated. The same rank is accorded *Cardinalis igneus*, though the equally distinct form belonging to southeastern Mexico (*C. cardinalis coccineus*) is referred to *C. virginianus*,* and to *Chondestes strigatus*, although the latter is no more different from *C. grammacus* than *Spizella socialis arizonæ*, *Passerculus sandwichensis alaudinus*, and *Coturniculus passerinus perpallidus* are from *S. socialis*, *P. sandwichensis* and *C. passerinus*, respectively, these three trinomials being given as mere synonyms of the binomials which follow. The differences between the two forms of *Chondestes* are, in fact, of exactly the same character as those which exist between the forms of *Spizella*, *Passerculus*, and *Coturniculus*, above mentioned; and if *Chondestes strigatus* is recognized as a species, so also should be *Spizella arizonæ*, *Passerculus alaudinus*, and *Coturniculus perpallidus*. But to accord these specific rank would be a violation of our knowledge of their relationships, for every ornithologist who has compared large series of specimens knows that they intergrade completely with their eastern or western representatives along the line where their habitats merge together, just as does *Chondestes grammacus strigatus* with the true *C. grammacus*.

Icterus cucullatus nelsoni is given as a distinct species (*I. nelsoni*), while an equally marked variation, in the opposite direction, from the typical form, *I. c. igneus*,† is considered the same as *I. cucullatus*.

These instances show clearly how useful, if not indispensable, is the modified form of the binomial system of nomenclature, which has been adopted and, as consistently as possible, followed by the Committee of the American Ornithologists' Union, and not a few of the working ornithologists of Europe as well.

In other cases, we regret to see forms which, in the light of material contained in collections on this side of the Atlantic, appear to be distinct enough to merit at least subspecific recognition, utterly ignored, except that their names are given in the synonymy. Such as these are the Mexican and Guatemalan Bluebirds (*Sialia sialis azurea* and *S. s. guatemalæ*), which are called simply *S. sialis; Icteria longicauda* (*I. virens longicauda* of American authors), which is considered a synonym of *I. virens*, yet is quite as different from the latter as is *Pyranga cooperi* from *P. æstiva;* and the following additional but no less conspicuous cases: The several South American forms of *Progne* which have uniform blue-black males

* On this subject see 'Proceedings of the United States National Museum,' Vol. VIII, 1885, pp. 569-570.

† See 'Proceedings of the United States National Museum,' Vol. VIII, p. 19.

are referred to *P. subis;* all the Central American Mockingbirds except the northern *M. polyglottos*, which occurs also in Mexico, are referred to the South American *M. gilvus*, a species which apparently extends no farther north than Guatemala, if, indeed, it occurs beyond Costa Rica, the Mexican forms which have been referred to it being at least subspecifically distinct.* The bird called *Molothrus æneus* includes two very distinct species, *M. æneus* (Wagl.) and *M. robustus* Cab., but up to the time the 'Biologia' was published the differences between them had not been pointed out.† The Meadowlarks are 'lumped' into one species, *Sturnella magna*, notwithstanding two very distinct forms (probably species), *S. magna mexicana* and *S. neglecta*, occur in Mexico, besides a third (*S. hippocrepis*) in Cuba. Under the name *Aphelocoma californica*, which belongs to a form whose range certainly does not extend into Mexico, except as a well-marked subspecies‡ in the peninsula of Lower California, are included the *A. sumichrasti* § and *A. cyanotis*‖, purely Mexican forms, whose respective ranges are separated from that of *A. californica* by the intrusion of *A. woodhousei*, in Arizona. The name *Aphelocoma ultramarina*, even if belonging to either of the forms which are referred to it, also covers, according to the synonymy, three well-marked forms, one of which is undoubtedly specifically distinct from the others. This is the *A. couchi*, a smaller and much shorter-tailed species than *A. sieberii*, with whiter under parts, the sides of the head much lighter and brighter blue, and the tail less graduated, found in the Mexican States of Tamaulipas and Nuevo Leon; *A. sieberii* of southern Mexico and its much paler and grayer northern race *A. s. arizonæ* being larger every way, with the tail proportionally longer as well as much more rounded, besides differing in the darker under parts and darker and less bluish color of the sides of the head. The two strongly marked forms of *Xanthoura* are likewise considered identical; yet no one having a series of specimens from the Rio Grande Valley and an equal number from Yucatan or Guatemala, *without specimens from intermediate localities*, would think of uniting them under one name. It is true that they intergrade; but if they did not, we should be justified in considering them distinct species (*X. luxuosa* and *X. guatemalensis*); recognizing, however, the fact of one extreme grading into the other, through specimens from intermediate localities, we should *not* be justified in thus naming them, a trinomial designation for the more recently named form (*X. luxuosa guatemalensis*) expressing their relationship much better.

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* See 'Proceedings of the United States National Museum,' Vol. V, pp. 10-12; Vol. VIII, p. 562, and Vol. X, p. 506.

†They were first formally separated, as *Callothrus æneus* and *C. robustus*, in the writer's 'Manual of North American Birds' (p. 589), in 1887.

‡ *A. c. hypoleuca*, 'Manual of North American Birds,' p. 356.

§ History of North American Birds, Vol. II, p. 283; Cat. B. Brit. Mus. Vol. III, p. 14; Man. N. Am. B., p. 356.

‖ Man. N. Am. B., p. 357.

We cannot agree with the authors of the 'Biologia' in referring *Zonotrichia vulcani* Boucard to the genus *Zonotrichia*, and *Fringilla chlorura* Aud. to the genus *Embernagra*, although the reasons given for such reference have been carefully considered. Regarding the former, these reasons are as follows: "This somewhat abnormal *Zonotrichia* was removed from this genus and placed in *Junco* by Mr. Ridgway chiefly on account of the color of the irides, which are yellow as in *J. cinereus* and its allies. No *Junco* has a spotted back in the adult nor a tail of uniform color." This statement however does not fairly represent the reasons given for considering the bird more a *Junco* than a *Zonotrichia*, for. while we said that "it agrees perfectly in its generic characters with the former, except that the back is streaked, while there is no white on the lateral tail-feathers," the color of the iris was mentioned only incidentally, as was also its alpine habitat. It is true that no other species of *Junco* has, when adult, a streaked back or lateral tail-feathers without a considerable white patch, and most of the species of *Junco* also have a dark brown iris. But it is equally true that no species of *Zonotrichia* * is without white wing-bands and very conspicuous black stripes on the head (or else with the head wholly black). Not one of them has the bill so slender as in '*Z.*' *vulcani*, the tarsi so lengthened, or the tail so short, compared with the wing. In all these structural characters it agrees closely with *Junco alticola*, as it does also, *very* closely too, in the uniform dull grayish head with distinctly blackish lores, the general coloration of the under parts, and the absence of wing markings; while a close inspection will discover distinct remains of the white tail-patches. In fact, were it not for the broad black streaks on the back, we doubt whether its reference to *Junco* would ever have been questioned. We admit that it is not a typical member of that genus; but if it is to be referred to one or the other, reasons for its reference to *Junco* appear to very greatly preponderate.†

No special reasons are assigned for placing the bird which we have been accustomed to call *Pipilo chlorurus* in the genus *Embernagra*, but this is apparently done on account of some resemblance in coloration, the bird in question and the typical *Embernagræ* having the wings and tail uniform olive green. The numerous and considerable differences of form, however, appear to have been overlooked, as well as the fact that other species of *Pipilo* approach *P. chlorurus* in one point or another of its aberrant coloration. All the true *Embernagræ* have the tail either decidedly shorter than the wing or else not any longer; *P. chlorurus*, on

* We consider the genus *Zonotrichia* a true Nearctic type, including only those species which belong to the North American fauna. They are all of boreal or alpine distribution, breeding chiefly north of the United States except at high elevations.

† If the streaked back of '*Junco*' *vulcani* is sufficient to exclude it from the genus *Junco*, why should not the streaked back (and plain or finely streaked head) of '*Embernagra*' *platensis* exclude that species from the genus *Embernagra*, all the other species of which have plain backs and conspicuously striped heads?

the other hand, has the tail much longer than the wing as do also the other species of *Pipilo*. No true *Embernagra* has a rufous pileum, but some true *Pipilos* have; no *Embernagra* has a white throat-patch and malar stripe, but such markings occur in *Pipilo rutilus*. Further, the olive green wings and tail of *P. chlorurus* are reproduced in *P. macronyx* and *P. chlorosoma*, large species of the black-headed and -chested and rufous-sided group, while *P. complexus** combines with the general plumage of the *P. maculatus* group the white throat-patch and rufous pileum of *P. chlorurus*, although these markings are less developed.

Notwithstanding the strong conservatism of the authors of the 'Biologia,' genera have fared well by them, and we observe with pleasure that such familiar and well-marked groups or types as those which until recently were familiar to us as *Lophophanes*, *Peucedramus*, *Oporornis*, *Passerculus*, and *Coturniculus*, degraded to the rank of subgenera by the A. O. U. committee, are recognized as genera. It matters little whether these are true genera or not; they are well-defined groups except *Peucedramus*, and that is an isolated or monotypic form, with characters as well defined as those of many so-called genera which have never or seldom been challenged. The species of *Merula*, however, are all ranged under *Turdus;* and, with this single exception, we have no particular fault to find with the treatment of genera, although from the A. O. U. standpoint some of the generic names should be different, or differently spelled, (*e. g. Myadestes* instead of *Myiadectes*, *Helmitherus* instead of *Helminthotherus*, *Helminthophila* instead of *Helminthophaga*, *Compsothlypis* instead of *Parula*, etc.).

There are a few forms given under names which belong to allied species or races, but they were either separated subsequent to the printing of the pages on which they occur or so soon before that the authors probably had not become aware of such separation. The bird called *Rhodinocichla rosea* is a case of this kind; the Mexican bird was named *R. rosea schistacea* in December, 1878,† and should probably be ranked as a species, not only on account of its marked differences of coloration and proportions from *R. rosea* but also because of the wide separation of its habitat.

We have already ‡ criticised the change of name in the Cliff Swallow from *Petrochelidon lunifrons* (Say) to *P. pyrrhonota* (Vieill.) and the reasons given for objecting to this change we still believe to be valid.

We have endeavored to point out as fully as possible the defects — from our standpoint — of this work, both as resulting from the insufficient material examined and the adoption of rules of nomenclature different from those which have been in vogue among American orthinologists, as well as the different views entertained by the authors regarding the question of species and subspecies. The small number of these defects in a work of such magnitude shows how well the authors of the 'Biologia' have performed their task.

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* See Proc. M. S. Nat. Mus., Vol. IX, pp. 147-148.

† Proc. U. S. Nat. Mus., Vol. I, p. 247.

‡ Proc. U. S. Nat. Mus., Vol. IX, p. 139, foot-note.

In conclusion we would say that by far the most unsatisfactory feature of the work is its slow progress. The first volume covers only about one third of the entire field, yet seven and a half years are comprised between the dates of publication of the first and last signatures. At this rate, we may look for the completion of the work not sooner than the close of the present century! It is to be hoped, however, that the authors may manage to hasten its completion, for, until the remaining families shall have been treated, any work done by others in the same field will be, necessarily, premature. — ROBERT RIDGWAY.

Saunders's Manual of British Birds.*—The purpose of the present volume is "to convey as much information *up to date* as may be practicable in *one volume*." The plan of the work, as the author says, "may justly be called Procrustean," just two pages being allowed to each species, the matter consisting of a full-length figure and a page and three quarters of text. Very few of the wood-cuts are new, nearly all being from "the blocks from which the illustrations were struck for the four editions of Yarrell's 'British Birds'," to which, however, have been added figures of many of the recent wanderers to Great Britain, and a few fresh figures of other species, including the Great Auk. In this small space the author has compressed a fair statement of the habitat and migrations of each species treated, of course, with special reference to its status as a British bird; a summary of its life-history, and a description of its external characters, including seasonal, sexual and other phases of plumage.

There is neither synonymy nor any bibliographical references, and the generic diagnoses are given in the 'Introduction', under their respective orders and families, arranged mainly in accordance with the B. O. U. 'List of British Birds.' The work is thus in a true sense a 'Manual',—an epitome of what is most interesting and most useful to the general reader. The addition of analytical keys and tables would perhaps have made the book more useful to the young student without greatly increasing the cost or size of the 'Manual'.

The number of species considered as unquestionably entitled to be reckoned as British is 367; a few others are incidentally mentioned, respecting the status of which there are conflicting opinions. "The species which have been ascertained to breed within the United Kingdom during the present century may be taken as 200; about 70 non-breeding wanderers have occurred fewer than six times, and 59 others are more or less infrequent visitors; while 38 species annually make their appearance on migration or during the colder months, in some portion of our long, narrow group of islands or the surrounding waters" (p. v).

* An Illustrated Manual | of | British Birds. | By | Howard Saunders, F. L. S., F. Z. S., &c. | Editor of the Third and fourth Volumes of "Yarrell's History of | British Birds," Fourth Edition. | With Illustrations of nearly every Species. | [Monogram.] London: Gurney and Jackson, 1, Paternoster Row. | (Successors to Mr. Van Voorst.) | 1889.—8vo, pp. xl + 754, with 3 maps, and "367 illustrations."

The author displays much conservatism, both in respect to the admission of alleged stragglers, and in the matter of subspecies. Thus a number of North American species often entered in British lists are ruled out on the ground that the specimens taken were in all probability escaped cage-birds, or "assisted" wanderers, or as "not likely to be genuine visitors." His position on the question of races is shown by his treatment of the British Tits, in several of which he admits the existence of "climatic races," but declines to give them recognition in nomenclature.

Three maps accompany this excellent work. The first is a 'Bathy-orographical map of the British Isles and surrounding seas': the second is a map of Europe, also bathy-orographical, and the third is a 'North Polar Chart,' useful as showing the range of birds breeding in the Arctic regions.—J. A. A.

Notes on Sport and Ornithology.*—His Imperial and Royal Highness, the late Crown Prince Rudolf, of Austria, was well known for his enthusiastic interest in ornithology. His 'Notes on Sport and Ornithology' is a series of pleasantly written sketches of ornithological expeditions, followed by a number of more formal ornithological papers. The first of these sketches is entitled, 'Fifteen Days on the Danube,' and occupies the first 227 pages of the book. Accompanying the Prince on this journey were, among others, the late Dr. Eugen von Homeyer, the younger Brehm, Hodek, father and son, and other more or less well-known naturalists and sportsmen, besides a retinue of hunters, guides and valets. The trip was made in the steamer 'Vienna,' which left Pesth with the party on the 22d of April, 1878. The special object of the journey was the solution of the question of whether the 'Stein' and Golden Eagles were or were not distinct species. The narrative here given recounts in a delightful way the experiences and successes of each day's hunt, giving incidentally a graphic picture of the low, somewhat marshy forests of the lower Danube, and their feathered inhabitants. Eagles and Vultures, and the larger birds of prey generally, together with Cormorants, Storks, and Herons, were the chief objects of quest, the smaller birds coming in for only a small share of attention. Among the ornithological results of the expedition were 9 Vultures, 29 Eagles, 24 Hawks, 8 Cormorants, 12 Storks, 15 Herons, and various smaller birds, the total numbering over 200 specimens and about 70 species. Much interesting information is given respecting the habits of many of the species mentioned, particularly of the Vultures and Eagles.

Next follow 'Extracts from a Journey in the East' (pp. 229-390), describing an ornithological trip in Lower Egypt and in Palestine, made in February, March, and April, 1881. The narrative is replete with interest-

*Notes | on | Sport and Ornithology | by | His Imperial and Royal Highness the late Crown Prince | Rudolf of Austria. | Translated, with the Author's permission, by C. G. Danforth. | [Monogram.] London: | Gurney and Jackson, | Paternoster Row. | (Successors to Mr. Van Voorst.) | 1889 — 8vo. pp. viii + 648.

ing notes of travel and sport, largely ornithological. Over 1000 specimens were taken, representing about 125 species of birds and 15 species of mammals.

About 50 pages are devoted to 'Ornithological Sketches from Spain,' and relate mainly to Vultures and Eagles, of which eight or nine species are more or less formally treated. 'Ornithological Sketches from the East' seems to be a systematic, annotated list of the birds observed during the 'Journey in the East' mentioned above.

The numerous minor papers give notes on birds observed in the vicinity of Vienna, during January 1 to June 1, 1882, November, 1883, February, 1884, and December, 1885, and include two papers on 'Hybrid Grouse,' and an annotated list of birds observed on the coast of Dalmatia and Istria. An excellent index concludes this very entertaining book of nearly 650 pages.—J. A. A.

Doan's Birds of West Virginia.*—The writer of this list spent the time from August 1 until November, 1888, travelling through the State stopping for a few days each at some fifteen different places. He says:—"During the last five weeks in the field the inclemency of the weather was such that it was impossible for me to do any collecting whatever; and as the season was far advanced and the remaining time short, my explorations were necessarily hurried. Much valuable time was lost in travelling in order to reach all the different districts, many of which are widely separated and remote from railroads. By far the most productive and satisfactory work was done at Buckhannon and vicinity during the month of August. The following list [of 200 species] contains all species that I personally identified, together with a few additions from Mr. William Brewster's paper on the 'Birds of Ritchie County,' and W. E. D. Scott's 'Birds of Kanawha County.'" He also acknowledges his "indebtedness to Dr. J. R. Mathers and Mrs. E. L. Day, of Buckhannon, for valuable notes on several species with which I did not meet." In spite of the fact that his field work was all done later than August 1, the author does not hesitate to enter many species as summer residents, and in the same bold spirit he gives others as winter residents, either at a guess, or upon some authority which he does not quote. Among all these unreliable statements are one or two records that would be valuable, if we dared believe them. There are others that are quite easy to believe, as the assertion that the Woodcock is "a lover of low damp places," or that "Turkey Buzzards feed upon carrion and are very useful birds."

Cynical readers may be amused to notice that, according to the author's observations, "in eastern Pennsylvania" various of the insect-eating species still adhere with surprising fidelity to the diet prescribed for them some years ago by Mr. T. G. Gentry.

* Bulletin No. 3. | of the | West Virginia | Agricultural Experiment Station | at | Morgantown, W. Va., | December, 1888, | — | Prepared under the Auspices of the West Virginia Agri- | cultural Experiment Station. | By Wm. D. Doan. | — | John A. Myers, Director. | Birds of West Virginia. 8vo pp. 41-88.

What object there can have been in publishing such a worthless production as this (10,000 copies were distributed), it is hard to imagine. We notice it chiefly to call attention to the folly and uselessness of issuing local lists that are based on few and imperfect observations. Every beginner in ornithology seems beset by a desire to print a list of the birds of his own neighborhood, and thinks himself quite competent for the task. The fact is there are few things that require such long training and exceptional talents to make the results of real value. Even then a list should not be published unless based on years of constant field-work or unless the region treated is practically unknown ground. It is, nevertheless, an excellent thing for the beginner to prepare his local list,—but for his own use. It gives him some valuable practice; its incompleteness may stimulate him to further discoveries; and it will doubtless afford him that most invaluable lesson,—how easy it is to make mistakes, and many of them.—C. F. B.

The Quadrate Bone in Birds.*—A paper by Miss Mary L. Walker treats of the quadrate bone of birds, describing one or more specimens from typical examples of each of the various groups proposed by Huxley. The quadrate is shown to have a characteristic shape in the different species examined, and from hastily running over a considerable number of crania it is apparent that the quadrate possesses much taxonomic importance. Its value, however, will doubtless prove to be comparative rather than positive, and will be found in the fact that it furnishes an additional point in summing up the evidence in any given case. Some of the facts brought forward in the paper show very clearly that, like most characters of birds, the form of the quadrate will need to be checked by others, and that, as has so often been said, it is not by any one character, but by the resultant of many, that birds must be classified. None of the Machrochires were examined by Miss Walker, and it may be said that the quadrate of Hummingbirds, Swifts, and Goatsuckers are built on the same general plan, the resemblance between Swifts and Goatsuckers in this particular being especially noticeable. The paper is confessedly "a short, and indeed, preliminary study," and it is to be hoped that we may soon see it extended, for we cannot have too many aids in the classification of birds, and each additional taxonomic character is to be welcomed.—F. A. L.

Minor Ornithological Publications.—There has not been much of ornithological interest in the literary monthlies since they were last noticed in this department. **Harper's Monthly** since Vol. LXXI (see Auk, II, 372) has contained nothing in Vols. LXXII-LXXIX worth noticing here. **Scribner's Magazine** has so far (Vol. I-VI) contained no ornithological matter. **The Century Magazine** was last noticed (Vol. XXVI, 1883) in the

*Studies from the Museum of Zoölogy in University College, Dundee. Edited by D'Arcy W. Thompson, Professor. I. On the Form of the Quadrate Bone in Birds. By Mary L. Walker.

'Bulletin of the Nuttall Ornithological Club,' Vol. VIII, 1883, p. 238; since then it has contained, in Vols. XXVII-XXXIX (Nov., 1883-April, 1890) the following (Nos. 1636-1644).

1636. *Bird Enemies.* By John Burroughs. '*The Century Illustrated Monthly Magazine*,' **Vol. XXXI**, No. 2, Dec., 1885, pp. 270-274.

1637. *Feathered Forms of Other Days.* By R. W. Shufeldt. *Ibid.*, No. 3, Jan., 1886, pp. 352-365.—Illustrated with figures of *Camptolaimus labradorius*, *Plautus impennis*, and several fossil birds.

1638. *Birds' Eggs.* By John Burroughs. *Ibid.*, Vol. XXXII, No. 2, June, 1886, pp. 273-278.

1639. *Sea Birds at the Farne Islands.* By Bryan Hook. *Ibid.*, No. 4, Aug., 1886, pp. 557-564.—A popular sketch, illustrated.

1640. *Notes from the Prairie.* By John Burroughs. *Ibid.*, No 5, Sept. 1886, pp. 784-790.—Contains a few notes on the Sand-hill Crane.

1641. *The Sportsman's Music.* By W. J. Henderson. *Ibid.*, Vol. XXXIV, No. 3, July, 1887, pp. 413-417.—With cuts, and musical notation of songs, of several birds.

1642. *Bird Music.* By Simeon Pease Cheney. *Ibid.*, Vol. XXXV, No. 6, April, 1888, pp. 845-848 (*Sialia sialis* and *Merula migratoria*); *ibid.*, Vol. XXXVI, No. 1, May, 1888, pp. 147-149 (Partridge and Owls); *ibid.*, No. 2, June, 1888, pp. 254-256 (*Icterus galbula*, *Turdus mustelinus*, *T. a. pallasii*, *T. fuscescens*); *ibid.*, No. 3, July, 1888, pp. 416-417 (*Melospiza fasciata*, *Spizella pusilla*); *ibid.*, No. 5, Sept., 1888, pp. 718-719 (*Icteria virens*, *Dolichonyx oryzivorus*, *Antrostomus vociferus*); *ibid.*, Vol. XXXVII, No. 1, Nov., 1888, p. 97 (*Urinator imber*); *ibid.*, Vol. XXXVIII. No. 2, June, 1889, pp. 234-235 (*Sturnella magna*, *Pipilo erythrophthalmus*, *Piranga erythromelas*, *Spinus tristis*). — With musical notation of songs.

1643. *Doves.* By E. S. Starr. *Ibid.*, pp. 698-703. — Contains some account of a nesting of *Ectopistes migratorius*.

1644. *Bird Music: Songs of the Western Meadow-Lark.* By Charles W. Allen. *Ibid.*, No. 6, Oct., 1888, pp. 908-911.—With musical notation.

The **Atlantic Monthly**, last noticed (Vol. LIII, No. 318, April, 1884) in Vol. II, p. 373, of 'The Auk', has since contained in Vols. LIII-LXIV (1884-1889) the following (Nos. 1645-1669).

1645. *The Bird of Solitude.* By Olive Thorne Miller. '*The Atlantic Monthly*,' **Vol. LIII**, No. 320, June, 1884, pp. 753-758.—A popular account of the characteristics of *Turdus mustelinus* and *T. a. pallasii*. Reprinted in 'Bird Ways,' Boston, 1885, pp. 13-29.

1646. *Bird Gazing in the White Mountains.* By Bradford Torrey. *Ibid.*, Vol. LIV, No. 321, July, 1884, pp. 51-59. — Reprinted in 'Birds in the Bush,' Boston, 1885, pp. 75-102, entitled 'In the White Mountains'.

1647. *In the Haunts of the Mockingbird.* By Maurice Thompson. *Ibid.*, No. 325, Nov., 1884, pp. 620-627.—Reprinted in 'By Ways and Bird Notes,' New York, 1885, pp. 5-22.

1648. *Winter Birds about Boston.* By Bradford Torrey. *Ibid.*, Vol.,

LV, No. 328, Feb., 1885, pp. 160-168. — Reprinted in 'Birds in the Bush,' Boston, 1885, pp. 185-210.

1649. *A Ruffian in Feathers.* By Olive Thorne Miller. *Ibid.*, No. 330, April, 1885, pp. 490-495. — *Passer domesticus.* Reprinted in 'Bird Ways,' Boston, 1885, pp. 151-159.

1650. *A Bird Lover's April.* By Bradford Torrey. *Ibid.*, No. 331, May, 1885, pp. 692-701.— Reprinted in 'Birds in the Bush,' Boston, 1885, pp. 211-241.

1651. *A Bit of Bird Life.* By Olive Thorne Miller. *Ibid.*, Vol. LVI, No. 333, July, 1885, pp. 70-74.—*Agelaius phœniceus.*

1652. "*Upon the Tree Top.*" By Olive Thorne Miller. *Ibid.*, No. 336, Oct., 1885, pp. 533-540.—Habits of *Icterus galbula.*

1653. *A Tricksy Spirit.* By Olive Thorne Miller. *Ibid.*, No. 337, Nov., 1885, pp. 676-685.—*Mimus polyglottos* in captivity.

1654. *The Genesis of Bird Song.* By Maurice Thompson. *Ibid.* Vol. LVII, No. 343, May, 1886, pp. 613-619.—A popular sketch of the palæontological history and the vocal apparatus of birds.

1655. *Confessions of a Bird's-Nest Hunter.* By Bradford Torrey. *Ibid.*, Vol. LVIII, No. 347, Sept., 1886, pp. 336-345. — Reprinted in 'A Rambler's Lease,' Boston, 1889, pp. 70-98.

1656. *A Bird of Affairs.* By Olive Thorne Miller. *Ibid.*, Vol. LIX, No. 352, Feb., 1887, pp. 178-183.—*Cyanocitta cristata* in captivity.

1657. *The Mockingbird's Nest.* By Olive Thorne Miller. *Ibid.*, No. 354, April, 1887, pp. 514-524.

1658. *Flutterbudget.* By Olive Thorne Miller. *Ibid.*, No. 355, May, 1887, pp. 678-682.—*Harporhynchus rufus* in captivity.

1659. *A Woodland Intimate.* By Bradford Torrey. *Ibid.*, Vol. XL, No. 359, Sept., 1887, pp. 349-355.—Remarkable tameness in *Vireo solitarius.* Reprinted in 'A Rambler's Lease,' Boston, 1889, pp. 22-44.

1660. *The "Wise Bluebird."* By Olive Thorne Miller. *Ibid.*, No. 360, Oct., 1887, pp. 455-460.

1661. *The Blue Jay.* By Olive Thorne Miller. *Ibid.*, Vol. LXI, No. 364, Feb., 1888, pp. 266-270.—Habits in captivity.

1662. *Virginia's Wooing.* By Olive Thorne Miller. *Ibid.*, No. 365, March, 1888, pp. 362-366.—*Cardinalis cardinalis* in captivity.

1663. *A Discord in Feathers.* By Olive Thorne Miller. *Ibid.*, No. 367, May, 1888, pp. 701-705.

1664. *A Green Mountain Corn-field.* By Bradford Torrey. *Ibid.*, Vol. LXII, No. 369, July, 1888, pp. 47-51.—Various birds mentioned. Reprinted in 'A Rambler's Lease,' Boston, 1889, pp. 99-113.

1665. *Home Life of the Redstart.* By Olive Thorne Miller. *Ibid.*, No. 371, Sept., 1888, pp. 353-358.

1666. *A November Chronicle.* By Bradford Torrey. *Ibid.*, No. 373, Nov., 1888, pp. 589-594. — Mention of various species observed in eastern Massachusetts. Reprinted in 'A Rambler's Lease,' Boston, 1889, pp. 121-139.

1667. *The Solitaire.* By Olive Thorne Miller. *Ibid.*, Vol. LXIII, No. 375, Jan., 1889, pp. 105-110.—*Myadestes obscurus* in confinement.

1668. *The "Black-capped" Baltimore.* By Olive Thorne Miller. *Ibid.*, Vol. LXIV, No. 382, Aug., 1889, pp. 265-270.—*Icterus galbula* in captivity.

1669. *December Out-of-doors.* By Bradford Torrey. *Ibid.*, No. 386, Dec., 1889, pp. 752-761.—Various birds noted in eastern Massachusetts in December, 1888.

Lippincott's Magazine during the years 1879-1889 (Vols. XXIII-XLIV) yields only the following (Nos. 1670, 1671).

1670. *Beach Birds.* By Nathan Clifford Brown. '*Lippincott's Monthly Magazine*,' **Vol. XXIII**, May, 1879, pp. 620-626.—An illustrated sketch of various species found on the beaches [near Scarboro, Maine?].

1671. *Notes on the Intelligence of Birds.* By Mary Treat. *Ibid.*, Vol. XXIV, Sept., 1879, pp. 359-364. — On habits of various species in New Jersey.

The Popular Science Monthly, Vols. XIV-XXXVI (Nov., 1878-April, 1890), besides various articles copied from other periodicals, contains the following (Nos. 1672-1677).

1672. *Notes on a Few of Our Birds.* By Harry Merrill. '*The Popular Science Monthly*,' **Vol. XVII**, No. 3, July, 1880, pp. 386-392.—Interesting notes, especially on breeding habits, of various birds in Maine.

1673. *Land Birds in Mid-ocean.* By George W. Grim. *Ibid.*, Vol. XXIV, No. 2, Dec., 1883, pp. 207-209.—A few interesting facts and suggestions.

1674. *The Social Life of Arctic Birds.* By Dr. Alfred E. Brehm. *Ibid.*, Vol. XXVIII, No. 2, Dec., 1885, pp. 209-216.—A popular sketch of the habits of several species.

1675. *Bird Migration.* By Barton W. Evermann. *Ibid.*, Vol. XXX, No. 6, April, 1887, pp. 803-810.—A popular review of the subject and its study in America.

1676. *The Home of the Great Auk.* By Frederic A. Lucas. *Ibid.*, Vol. XXXIII, No. 4, Aug., 1888, pp. 456-464.—An account of the writer's visit to Funk Island.

1677. *Birds with Teeth.* By Otto Meyer, Ph. D. *Ibid.*, Vol. XXXVI. No. 3, Jan., 1890, pp. 382-389.—A short illustrated sketch of several fossil species.—C. F. B.

Publications Received. — **Allen**, J. A. On the Maximilian Types of South American birds in the American Museum of Natural History. (Bull. Am. Mus. Nat. Hist., II, No. 3, pp. 209-276, Dec. 1889.)

Anthony, A. W. New Birds from Lower California, Mexico. (Proc. Cal. Acad. Sci., 2d Ser., II, pp. 73-82, Nov. 1889.)

Berlepsch, Hans von. Systematische Verzeichniss der von Herrn Gustav Garlepp in Brasilien und Nord Peru im Gebiete des oberen Amazonas gesammelten Vogelbälge. (Journ. f. Orn. 1889, pp. 289-321, pl. iii.)

Bryant, W. E. A Catalogue of the Birds of Lower California, Mexico. (Proc. Cal. Acad. Sci., 2d Ser., II, pp. 237-320, Dec. 1889.)

Fellmer, Lt. Experimente über Hin- und Rückflug der Militar-Brieftauben. Berlin, 1889, 8vo. pp. 32.

Fisher, A. K. Evening Grosbeaks in New York. (Forest & Stream, XXXIV, 1890, pp. 64, 65.)

Foster, L. S. The Snowy Owl. (Forest & Stream, Dec. 26, 1889.)

Gurney, J. H. [Notes on some East African Birds.] (Ibis, Jan. 1890, pp. 126-128.)

Leverkuhn, Paul. (1) Ueber Farbenvarietäten bei Vogeln. (Journ. f. Orn. 1889.) (2) Der ornithologische Nachlass Adolf Meyer's, Beiträge zur Kentniss der Avifauna der Provinz Hannover. (Ibid.) (3) Südamerikanische Nova aus dem Kieler Museum. (Ibid.) (4) Ein Flug durch die Schweiz. (Zeits. f. Orn. 1889.) (5) Monatschrift des Deutschen Vereins zum Schutze der Vogelwelt. Index der ersten zwölf Jahrgang, 1876-1887. (6) Litterarisches über das Steppenhuhn, II Revue, nebst Original Mittheilungen über die 1888er Invasion. (Monats. Deutsch. Ver. zum Schutze der Vogelwelt, 1889.) (7) Die Vögel unseres Gartens in Hannover. (Ibid.) (8) The Dicky Bird Society. (Ibid.) (9) Litterarisches. (Ibid.) (10) Sections- und Krankheitsberichte. (Ibid.) (11) Beschreibung zweier Rackelhähne und einer hahnenfedrigen Auerhenne. (Die Schwalbe, Jahr. XIII.) (12) Welche Vögel nennt der Koran? (Zeits. fur ges. Orn., IV.) (13) Der Wiedehopf in den Legenden der Araber. (Zool. Gart. Jahr. XXX.)

Meyer, A. B. Beschreibung der bisher unbekannten Weibchen von *Astrarchia stephaniæ* und *Epimachus macleayanæ*. (Journ. f. Orn., 1889, pp. 321-326.)

Nehrling, H. Nord-Amerikanische Vogelwelt. Heft 6.

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GENERAL NOTES.

The Appearance of the Razor-billed Auk (*Alca torda*) on the Coast of North Carolina.—Not long since Lieut. D. F. Foley, U. S. N., sent to the Department of Agriculture a head, wing, and foot of the Razor-billed Auk for identification. He stated that the bird was shot on February 15, 1890, in Lookout Cove, North Carolina, and that others were observed at the same place.

As far as known to the writer, this locality is the most southern point from which the species has been obtained. In a previous number of 'The Auk' (IV, 1887, 158) Mr. Frederick S. Webster records a specimen from Norfolk, Virginia.—A. K. Fisher, M.D., *Washington, D. C.*

The Great Auk in the U. S. National Museum.—The Great Auk in the collection of the U. S. National Museum has recently been remounted by Mr. N. R. Wood, and is thereby greatly improved in appearance. Although the specimen is more than fifty years old, the skin proved to be in fair condition, although naturally so venerable a bird needed careful manipulation.

Like nearly all mounted specimens of the Great Auk this was far too long, and even now that it has been shortened between two and three inches still remains at least so much longer than in life.

Measured along the curve the length of the stuffed specimen is a little more than twenty-nine inches from tip of beak to root of tail, while a

large skeleton, similarly measured, is but a trifle more than twenty-five inches in length.

A life-sized, colored photograph of the bird as it appeared before remounting is preserved in the collection. — F. A. LUCAS, *Washington, D. C.*

Eggs of the Florida Dusky Duck. A set of the eggs of the Florida Dusky Duck (*Anas fulvigula*) were taken by Mr. O. A. Quartermain on the Banana River, Florida, May 22, 1889 .The set contained ten eggs, which are almost white in color, showing a very faint tinge of green when held in the light. An average specimen measured 2.15 × 1.60 inches.—CHARLES B. CORY, *Boston, Mass.*

Another Capture of the Widgeon (*Anas penelope*) on the Atlantic Coast.—On January 11, 1890, I saw a very fine adult male hanging in a marketman's stall in New York City, near Washington Market. On inquiry, I learned that it had been shipped from Baltimore to New York, and doubtless was shot on Chesapeake Bay. It was hanging amongst a lot of Dusky Ducks (*Anas obscura*) with which it was said to have been received. It has been mounted and placed in the collection of the American Museum of Natural History, New York. Its fresh measurements were as follows: length, 495 mm.; alar expanse, 850 mm.; wing, 260 mm.; tail, 116 mm.; culmen, 34 mm.; tarsus, 40 mm.—EDGAR A. MEARNS, M.D., *Fort Snelling, Minn.*

Capture of a Specimen of Somateria dresseri in the vicinity of Ottawa, Canada.—On November 7, 1889, after a strong easterly storm the writer shot a young male of this species, in the plumage of the female, while flying up the River Ottawa a short distance below the City. This is, I believe, the first specimen obtained in this locality.—GEO. R. WHITE, *Ottawa, Canada.*

The Red Phalarope on Lake Erie.—I take pleasure in making the following record of the occurrence of the Red Phalarope (*Cry mophilus fulicarius*) on Lake Erie at the mouth of the River Raisin, Monroe, Michigan. On October 24, 1888, Mr. Ralph Brandreth noticed the bird sitting in the water and shot it. It was in summer plumage. It was mounted, and is now temporarily in my possession.—ROBT. B. LAWRENCE, *New York City.*

Recent Occurrence of the Turkey Vulture in Eastern Massachusetts.—Messrs. Goodale and Frazar, the Boston taxidermists, have lately mounted a Turkey Vulture which was shot at Essex, Massachusetts, Nov. 16, 1889 The species has been bought for the Essex County collection of the Peabody Museum of Salem. There are records of four previous occurrences in the State, one by Samuels (Agr. Mass., Secy's Rep. 1863, App., p. xviii) of two specimens taken in 1863, another by Maynard (Nat. Guide,

1870, 137) of a bird seen in Waltham, August, 1867, and a third by Mason (Auk, VI, Jan., 1889, p. 71) of an example shot in West Falmouth, Sept. 9, 1888. Two supposed "Massachusetts instances," referred to by Dr. Coues in New England Bird Life (II, 1883, 137), have been since shown by Mr. llenA (Bull. Am. Mus. Nat. Hist., No 7, 1886, 242 (foot-note), to really relate to Maine instead of Massachusetts.—WILLIAM BREWSTER, *Cambridge, Mass.*

Harlan's Hawk a Race of the Red-tail, and not a Distinct Species.—An adult specimen belonging to the Iowa College Museum, Grinnell, Iowa, which Dr. Merriam has kindly submitted to me for examination, is so clearly intermediate between *B. harlani* and *B. borealis* that I have no longer any doubt that the former is simply a peculiar variation of the latter, in which the coloration of the tail is chiefly affected. In this Iowa specimen the plumage is in every respect, except the tail, that of typical *B. borealis*, while the tail has the curious mixed coloration so characteristic of the so-called *B. harlani*. The ground color of the tail is chiefly white, but this is much broken by numerous *longitudinal* mottlings and spots or other markings of dusky in longitudinal series, both webs of the feathers being thus marked. Most of the rectrices have a greater or less amount of rufous suffusion along the edge of the outer web, while the inner web of the middle feather on the right side is almost entirely rufous, though this color is broken by the usual dusky blotches; all the rectrices have a suffusion of rufous near their tips, which are narrowly white, the subterminal dusky bar of typical *B. borealis* being slightly indicated by dusky blotches and rather extensive dark brownish gray shading. In addition to the distinct dusky markings and rufous washes, many of the rectrices are washed with brownish gray on portions of their outer webs, this gray wash being also more or less mottled or blotched with darker. The specimen is probably a female, the measurements being as follows: Wing, 16.75 inches; tail, 9.35; culmen, 1.10; tarsus, 3.20 (unfeathered portion in front, to tips of feathers, 1.16); middle toe, 1.75; the outer toe about .15 longer than the inner.

The technical name of Harlan's Hawk should therefore be changed to *Buteo borealis harlani* (Aud.).—ROBERT RIDGWAY, *Washington, D. C.*

Capture of a Third Specimen of the Barn Owl in Massachusetts.—Through the kind offices of Mr. J. A. Farley I have just obtained a Barn Owl (*Strix pratincola*) which was taken by Mr. C. T. Wood at South Westport, Massachusetts, Dec. 30, 1888. It is a male in fine plumage and was mounted by Mr. H. P. Babcock of New Bedford. Mr. Wood writes that he shot the bird in a bushy pasture on 'Horse Neck', within a few rods of a salt creek. The specimen is, I believe, only the third that is known to have been taken in Massachusetts.—WILLIAM BREWSTER, *Cambridge, Mass.*

The Great Gray Owl in Lewis County, New York. — I take pleasure in recording the capture of the Great Gray Owl (*Scotiaptex cinerea*) in this locality. It is, I believe, the first authentic instance of its capture in this County (Lewis). It was shot by a farmer in the town of Watson, Dec. 17, 1889, and is now in my collection. The farmer said that he was slaughtering swine, and the Owl flew from an adjoining piece of woods, alighting in a tree in the yard (doubtless attracted by the fresh meat). The bird, which was an adult female, was in very poor condition and the stomach was empty.—JAMES H. MILLER, *Lowville, N. Y.*

Picoides arcticus in Central New York.—The Arctic Three-toed Woodpecker is undoubtedly one of the rarest winter visitants in central New York, and its occurrence in Onondaga County in the vicinity of Syracuse has, I believe, never been made public. It is with pleasure therefore that I record two instances of its capture that have come under my notice.

On December 25, 1883, Mr. E. F. Northrup took a specimen in a swamp a few miles north of the city, but through ignorance of its value delayed skinning it until too late. I saw the bird on several occasions doing duty as copy for a water-color sketch, and tried to secure possession of it, but without success, and to my disgust it was finally thrown into an ash barrel as unfit to skin. A mention of this capture was made in Bulletin No. 1 of the Biological Laboratory of Syracuse University, published in February, 1886, by Morgan K. Barnum, entitled 'List of the birds of Onondaga County.' This Bulletin, however, was not a success, and beyond a few copies given to applicants and friends the entire issue was stored away in the College archives.

The second specimen, an immature female, was taken at Tully, New York, on February 22, 1889, by my friend Mr. J. A. Dakin who kindly consented that it should form a part of my own collection. He informs me that it was exceedingly shy and difficult of approach, and that it was only after a long pursuit and some sharp manœuvring that it was finally secured.—E. M. HASBROUCK, *Washington, D. C.*

The Red-bellied Woodpecker in Northwestern New Jersey. — I shot a female Red-bellied Woodpecker (*Melanerpes carolinus*) at Newton, New Jersey, on the 16th of November, 1889. I have only found this species in northern New Jersey on one or two occasions, but it is of more frequent occurrence in the southern part of the State.—STEWART LEWIS, *American Museum of Natural History, New York City.*

Food of Young Hummingbirds.—July 2, 1887, Mr. E. S. Hoar of Concord, Mass, found a Ruby-throated Hummingbird's nest in his garden. It was saddled on the drooping branch of an apple tree about eight feet above the ground, and contained two eggs which were hatched July 4. On the 7th Mr. Hoar kindly allowed me to inspect the nest and its contents. The young were then nearly as large* as their mother, and were

*It is remarkable that they should have attained so large a size in so short a time. They did not, however, leave the nest until July 18.

covered with pin-feathers of a dark brown color. Their bills were perhaps a quarter of an inch long, wide at the base, and in general shape not unlike the bill of a *Dendroica*, but more depressed.

Taking a station near the tree I watched the nest for two hours (from 11 A.M. to 1 P.M.). During this period the female visited it three times. At her first coming she fed the young, and after brooding them for forty-five minutes, buzzed about in the tree (not once leaving it) for about a minute. She then returned to the nest and fed the young again, one of them twice in succession. Immediately afterward she flew off out of sight and was absent sixteen minutes. At the end of this time she came directly to the nest, fed each young bird once, brooded both for six minutes, and then again flew away not reappearing during the remaining twenty minutes of my stay.

Her manner of feeding her offspring was as follows: Alighting on the edge of the nest, her tail pressed firmly against its outer side in the manner of a Woodpecker, her body erect, she would first look nervously around, then thrust at least three quarters of the total length of her bill down between the upraised open mandibles of the young bird. Next she would shake her head violently as if disgorging something; then, with their bills glued tightly together, both birds would remain, for the space of several seconds, perfectly immovable save for a slight, rapid, pulsating or quivering motion of the mother's throat. The actual contact of the bills lasted once four seconds, once six seconds, and twice eleven seconds, the time being taken with a stop watch. The male did not appear at all. The young were perfectly silent. The mother in brooding them kept moving restlessly about as if she were trampling on them.

The close and prolonged contact of bills, the shaking of the mother's head, the subsequent quivering motion of her throat, and, above all, the fact that after sitting on the nest nearly an hour she fed the young a second time without once leaving the tree in the interim, convinced me that the method of feeding was by regurgitation.

The character of the food thus supplied I could not, of course, ascertain without killing and dissecting one of the young, a proceeding which my kind-hearted host would certainly not have sanctioned.

The observations above detailed were made at a distance of about ten yards from a point only a few feet below the level of the nest, and with the aid of a powerful field glass. As the day was clear and the light strong I could see the birds nearly as well as if I held the nest in my hand.— WILLIAM BREWSTER, *Cambridge, Mass.*

Remarks on certain species of Dendrornis.— Since my paper on *Dendrornis* has been printed, the American Museum of Natural History has received from the Vienna Museum the three species mentioned in a footnote to page 163, viz.: *D. ocellata* Spix, *D. spixi* Less., and *D. elegans* Pelz., and I am therefore able to publish my conclusions in this number of 'The Auk.'

The specimens of *D. ocellata*, so determined by von Pelzeln, before me are marked male and female, and differ from each other in the general smaller dimensions and shorter bill of the female. These examples cannot be separated from *D. weddelli* Lafres., with the types of which I have compared them.

If therefore these specimens from von Pelzeln have been compared with Spix's type and found identical, then Lafresnaye's species must become a synonym of *D. ocellata*, but if not, then I am still in doubt as to what *D. ocellata* really is. If Spix's type is still in existence, this point could be easily settled by the Continental ornithologists.

A single example of *D. spixi*, and which agrees fairly well with Spix's description and figure, shows that this species is very nearly related to *D. guttatoides* Lafres., but differs in much more slender bill, generally smaller dimensions, and different coloration on the back and under parts, with, however, the same character of spots. It may be described as follows: Top of head and back of neck brownish black, each feather with a central, pale buff, tear shaped spot, more elongated on the neck. Back, yellow-olivaceous-brown with broad, central, buff stripes bordered with black. Rump and upper tail-coverts dark cinnamon. Throat pale buff, each feather indistinctly margined with pale brown. Entire under parts grayish-olive-brown, each feather with a broad, central, buff streak, margined with black, some of these streaks on upper part of breast being a bright buff. Wings and tail dark cinnamon. Bill long and slender, dark brown, paler at the tip. Feet horn brown. Length, $8\frac{3}{4}$ in.; wing, $3\frac{3}{4}$ in.; tail, $3\frac{5}{8}$ in.: bill, $1\frac{1}{4}$ in. Specimen described No. 48,149, collection American Museum of Natural History ex Para (Natterer).

In my key of the species *D. spixi* will have to be removed from the position given it and placed after *D. guttatoides* as "C. Bill long, slender, longer than head. Throat and stripes on breast buff."

D. elegans Pelz. is a very distinct species, and well characterized by the description quoted from the Orn. Bras. Its position in the key is quite correct.—D. G. Elliot, *Am. Mus. Nat. Hist., New York City.*

The Purple Grackle at Charleston, South Carolina.—Mr. Wayne has at length taken true ♀ *quiscula* near Charleston. The specimen, which he sends me for examination, is a female in high plumage. I cannot see that it differs at all from several of the females in my collection from the Middle States. It was shot by Mr. Wayne, Nov. 30, 1889, at Pinopolis, a ew miles from the City proper.—William Brewster, *Cambridge, Mass.*

Quiscalus quiscula æneus Killing and Catching Goldfish.—During the past summer, while noting the condition of my goldfish pond I frequently found many bodies of these fishes floating, bearing evidence of some sharp instrument having been used to effect their death: deep incisions, holes, and grooves in their heads and backs, etc. Carefully killing every Kingfisher and all the Herons, Bitterns being wholly absent, I became very much puzzled at the constant loss of life among these pretty fish of which

I have, I presume, some 3000 individuals in the pond. I first observed this evidence of destruction early in May last, and it was not until late in July that I detected the cause of it.

Large flocks of *Quiscalus q. æneus* make their home annually from early spring till late every fall, in the pine, spruce and hemlock groves which belong to my grounds; as I do not raise cereals, and devote my land to fruit culture, I regard these birds as the most valuable of their kind to me, and never have permitted them to be shot at or disturbed on my premises. Going down to my pond, as usual, in quest of Kingfishers, I happened to take notice of a Crow Blackbird in the act of striking quickly with its bill into the water at the edge of the bank. Wondering what it found there for food, I cautiously approached, sneaking behind the shelter of an evergreen and bed of flowering shrubs. This bird had struck a small goldfish as it came up to the water's edge—struck it in the centre of its head with the sharp point of its bill. This blow only stunned the fish, but rendered it unable to dart away, although it could still squirm and wriggle; the Blackbird was earnestly trying to land its prey by repeatedly striking the fish so as to get a beak hold, which it finally did after many failures. Catching sight of me, it at once flew away, leaving the writhing and mortally wounded victim upon the earth. The mystery of that peculiar destruction of my goldfish was thus solved.

The habit of goldfish whereby they suck and bore at and into the grassy and mossy edges of a pond as they feed, renders them a comparatively shining mark for *Quiscalus*.—HENRY W. ELLIOTT, *near Cleveland, Ohio.*

The Evening Grosbeak at Montreal.—Mr. William Brewster in a note to 'Forest and Stream,' Feb. 6, 1890, records the occurrence of the Evening Grosbeak (*Coccothraustes vespertina*) in eastern New Hampshire and Massachusetts, and Dr. A. K. Fisher of Washington, D. C., also Mr. J. Alden Loring of Oswego, N. Y., and Mr. J. L. Davison of Lockport, N. Y., records its occurrence in New York State, between the dates of Dec. 14, 1889, and Feb. 1, 1890. My attention was drawn to its occurrence here by Mr. Caulfield, taxidermist, one having been shot in this city by Mr. John H. R. Molson's gardener in the last week in January, 1890, and four at Laprairie, on the south side of the St. Lawrence River about nine miles above Montreal, on Feb. 5. I saw two of these birds after they were stuffed. I believe this is the first record of their occurrence in this district.—ERNEST D. WINTLE, *Montreal, Canada.*

Coccothraustes vespertina in Erie County, N. Y.—On the 15th of April, 1887, Mr. B. W. Fenton of Buffalo shot a pair (male and female) of Evening Grosbeaks at Brant, Erie County, N. Y., and brought the male's head to the late Charles Linden for identification. This observation was published by Prof. Linden in the 'Forest and Stream,' Vol. XXVIII, 1887, p. 367. This is, I believe, the first record from New York State which is backed by a specimen: the above-mentioned head is now in the collection of Mr. A. H. Alberger of Buffalo, and places the record beyond cavil.

On Jan. 10, 1890, Mr. D. W. Fenton observed a flock of nine Evening Grosbeaks in our City Park, and on the following day with his assistance I was able to secure three specimens, two females and one immature male. The birds were very tame, and were feeding on the seeds of the maple.

On the 18th of January, 1890, Mr. Geo. Harris of West Seneca, Erie County, received a fine male of this species, which had been shot at West Seneca. He was informed that the bird was in full song on a low bush when shot, and that no more were seen at the time.

These facts, excepting the Harris record, are also embodied in a report to 'Forest and Stream' (Vol. XXXIV, 1890, pp. 64, 65,) by Dr. A. K. Fisher.—W. H. BERGTOLD, M. D., *Buffalo, N. Y.*

Evening Grosbeaks in Vermont. — During the last few weeks, there has been around my house here, a flock of Evening Grosbeaks (*Coccothraustes vespertina*), consisting of about a dozen individuals, more than half males in the most brilliant plumage. They seem especially fond of the seeds still hanging on a box elder tree.—W. W. COOKE, *Burlington, Vermont, Feb. 20, 1890.*

Coccothraustes vespertina at Amherst, Massachusetts.—On January 8, 1890, I was visited by a farmer from the southern part of Amherst, who had with him a bird he desired me to name for him. I recognized it at once as a male *Coccothraustes vespertina* in fine adult plumage. The man said his boy had shot it a day or two before as it was perched on the top of a cherry tree near his house. There were two together but the other escaped. The one that he shot he said was singing finely at the time, and seemed much brighter colored than the other. We have had very mild weather this year and no snow at all.

I had no difficulty in obtaining a good skin, and soon it will grace the collection of Amherst birds in the Amherst College cabinet.—HUBERT L. CLARK, *Amherst, Mass.*

Evening Grosbeaks in Hampden County, Massachusetts.—A few days since Mr. Rufus E. Bond brought into the Museum of the Worcester Natural History Society an Evening Grosbeak which was killed by Mr. Louis James in East Brimfield, Mass., on February 1. Neither of these gentlemen knew the bird, but thinking it might be something of interest to the Museum Mr. Bond, who is a member of the school board of Fishdale, at once brought it to us. A small flock of the birds, perhaps a dozen in all, had been seen about the house for several days. The bird is an adult male in fine plumage. I have preserved it for our collection.

Some of the cyclonic storms of the past month have been followed by strong west winds. This may account for the presence of the birds so far to the east of their usual habitat.—E. H. FORBUSH, *Worcester, Mass.*

The Evening Grosbeak in Connecticut.—A female Evening Grosbeak (*Coccothraustes vespertina*) was shot at Gaylordsville, Conn., March 10, 1890, by Mr. E. H. Austin of that place, who kindly forwarded it to me. Mr. Austin writes that it was one of four or five that came near his house, and that one of them was very yellow, probably an adult male. Gaylordsville —a district of the town of New Milford—is on the Housatonic River, but a few miles from the New York State line.—C. K. AVERILL, JR., *Bridgeport, Conn.*

Evening and Pine Grosbeaks in Ontario.*—Large and numerous flocks of these two species (*Coccothraustes vespertina* and *Pinicola enucleator*) have appeared this year in the Province of Ontario. They are reported from Kingston, Toronto, southern Peel Co., and Hamilton; no doubt more extended observation would show a universal distribution at least along the northern shore of Lake Ontario. The first comers of this migration were observed about New Year's Day, and since then large numbers of both species have been reported from all points under observation. Sometimes the species are in separate flocks, and sometimes together. When not associated with the Pine Grosbeaks, the Evening Grosbeaks have usually been observed on the ground, where their actions are much like those of the *Pipilo erythrophthalmus;* the food that they find there is seeds of maple (*Acer saccharinum?*), stones of choke cherry, and common ed haws; these latter are found in their stomachs all crushed, no doubt, by the powerful mandibles of the birds.

The Pine Grosbeaks are usually seen feeding on the berries of the mountain-ash, and the crops and gizzards of many that have been shot have been found crammed with the seeds of the black ash, divested of the outer covering in most cases.

This migration is so great and so unusual that all the papers have had notices of it, and every one about here who makes any pretention to being a naturalist has added numerous examples of both species to his collection.

It is interesting to note that last winter there were no records here for the Evening and but one or two for the Pine Grosbeaks; the winter was a severe one, while this is unusually mild so far (Jan. 27), so it seems as if the abundant food supply, rather than any climatic conditions directly, might have had to do with the migration.—ERNEST E. THOMPSON, *Toronto, Ont.*

The Ipswich Sparrow in Georgia.—I took on Jan. 8, 1890, a fine male specimen of the Ipswich Sparrow (*Ammodramus princeps*) on 'Jack's Bank,' a bleak, grassy coast island, just south of the Altamaha River, in Glynn County, Georgia. On Jan. 15 I secured another specimen, a

*For further records of the eastward movement of Evening Grosbeaks during the past winter see the following: 'Forest and Stream', Vol. XXIV, Feb. 6, 1890, pp. 44, 45; Feb. 13, pp. 64, 65; Feb. 27, pp. 103 104; March 6, p. 123; March 13, p. 143; March 20, p. 167; March 27, p. 187.—'Ornithologist and Oölogist', Vol. XV, No. 2, Feb., 1890, pp. 27-28; No. 3, March, 1890, p. 46.

female, within a hundred yards of where the first was shot, and on Jan. 27 I saw another in the same place, but failed to secure it. This evidence leads me to believe that this bird may be found, in *suitable places*, all along the coast, at least as far south as this. The place resembles, in everything except climate, their favorite haunts on the south shore of Long Island, N. Y.

I believe this record extends its range considerably south, at least on the Atlantic coast.—W. W. WORTHINGTON, *Shelter Island, N. Y.*

The Acadian Sharp-tailed Sparrow and Scott's Seaside Sparrow on the Coast of South Carolina. — Among a large number of Sharp-tailed Sparrows which have been collected for me on the coast of South Carolina, I find no less than five typical examples of *Ammodramus caudacutus subvirgatus*. Three of these were taken at Frogmore by Mr. Hoxie in the spring of 1886 (♀ March 19, ♂ April 19, ♂ April 20), the remaining two near Charleston by Mr. Wayne in the autumn of 1889 (♀ Oct. 25, ♂ Oct. 30). My South Carolina series, as a whole, indicates that typical *caudacutus* is the prevailing form, *nelsoni* next in numbers, and *subvirgatus* the least common. It furnishes no evidence that any one of these forms breeds in the State. There is, I think, no previous record — at least no specific record—of the occurrence of *subvirgatus* in South Carolina.

I have also a Seaside Sparrow (a female) killed near Charleston by Mr. Wayne, Oct. 29, 1889, which Mr. Allen considers "quite far on the way towards *peninsulæ* and * * * perhaps nearer this form than it is to *maritimus*," and which Mr. Wayne assures me is very much darker than any specimen that he has hitherto taken. All the autumn and winter examples which he has sent me, except the one just mentioned, are typical *maritimus*. I have seen no breeding Seaside Sparrows from any locality on the coast of South Carolina, but the form which I found breeding in the salt marshes at St. Mary's, Georgia, in 1877, was unmistakably *maritimus*, not one of the dozen or more birds that I preserved (several of them were taken with nests and sets of eggs) showing the slightest approach to *peninsulæ*. In view of these facts it is hard to explain the occurrence of *peninsulæ* in autumn or early winter* at points north of St. Mary's, unless it may be assumed that a few individuals of this subspecies occasionally wander northward in autumn, from their breeding grounds on the Gulf Coast.—WILLIAM BREWSTER, *Cambridge, Mass.*

Passer domesticus in Cape Breton.—It seems noteworthy that the House Sparrow made its first appearance in Cape Breton coincidently with the completion of the Cape Breton Railroad, during the month of November last. It is probable that the Sparrow followed up the line of the road under construction, attracted by the grain and other supplies transported.—W. P. COUES, *Cambridge, Mass.*

* Mr. Allen has recorded (Auk, V, Oct., 1888, p. 426) a "typical *A. m. peninsulæ*" shot at Sapelo Island, Dec. 14, 1887. I have also two specimens from the same locality (♀, Dec. 1, ♀, Dec. 3, 1887) which although not quite typical, must be referred to *peninsulæ*.

Shrikes of Minnesota.—Not exactly knowing the true position held by he Shrikes of Minnesota, I submitted a small series of four to Mr. Ridgway for identification, two from Minneapolis, which were dark colored specimens, and two, which were much lighter, from Lanesboro in the southern part of the State.

The following was the result of the examination. He says: "None of your Shrikes are typical of either *ludovicianus* or *excubitorides*, all being intermediate between the two forms. The specimen I have marked 'A' [one of those from Minneapolis] comes nearest the former, but is not dark enough in the coloration of the upper parts; the others come decidedly nearer *excubitorides* than *ludovicianus*, but are not pale enough to be typical."—GEO. G. CANTWELL, *Lake Mills, Wis.*

Notes on some Minnesota Birds.—It is thought that sufficient interest attaches to the occurrence in Minnesota of the five species of birds mentioned below to justify the publication at this time of the following notes in regard to them. Two of the five—the Burrowing Owl and Henslow's Sparrow—are here reported from the State for the first time, so far as the writer can discover. The published statements in regard to the others have been in such general terms as to give no very definite idea of the real manner of their occurrence.

Colymbus holbœlii. HOLBŒLL'S GREBE.—This bird is found in limited numbers during the summer season in the west-central part of the State. It may, and doubtless does, occur in other portions of the prairie region of the State, but as yet no positive evidence of its presence has been obtained. Birds supposed to be of this species were seen in Elbow Lake, Grant Co., in June, 1879, by Mr. Franklin Benner and the writer, but no positive identification could be then made. Its eggs, taken in the vicinity, were seen at that time in the collection of Mr. Jasper N. Sanford of the town of Elbow Lake. Subsequently, in the fall of 1881, in response to numerous inquiries, Mr. Sanford kindly sent to me the skin of a male of this species together with several eggs taken early in the preceding summer near Elbow Lake. These specimens are now in my collection. This affords satisfactory assurance of the breeding of this Grebe in Minnesota.

Speotyto cunicularia hypogæa. BURROWING OWL.—On July 19, 1881, while passing through the southwestern part of Swift County, which lies in the western part of Minnesota, I came upon a small colony of these Owls living in fox or badger dens in a prairie hillside. There were apparently not more than two pairs of old birds with the young of the year. One of the young birds was shot, and the skin preserved. Many weeks spent in travelling through the prairie portions of the State failed to disclose the presence of this bird in any other locality.

Ammodramus henslowii. HENSLOW'S SPARROW.—A male bird in full song was taken by the writer on June 16, 1880, near Minneapolis, and the species was evidently breeding in the wet marsh where it was shot. In February, 1881, I was shown a specimen by Mr. W. W. Eager which he

had shot June 25, 1880, in Grant County in the west-central part of Minnesota. Mr. Eager regarded the bird as not uncommon in that locality, but Mr. Benner and myself failed to find it during two weeks collecting in the same County in 1879. Dr. Wm. L. Abbott includes this species without comment in a list of birds ('Forest and Stream,' Jan. 15, 1880) taken in July, 1879, at Pembina, N. D., which is in the Red River Valley close to the extreme northwestern corner of Minnesota.

Spizella pusilla. FIELD SPARROW.—Though long familiar with the characteristic song and habits of this bird through an acquaintance formed in the East, I have, in an experience of fifteen years in many parts of the State lying north of the latitude of Minneapolis, been enabled to detect it with certainty in only one locality—northern Ramsey County. Here I obtained the first specimen June 24, 1884. On visiting in June, 1889, the same locality, which is an extensive tract of uncultivated sandy country covered with a scattered growth of 'black' and bur oaks of small size, I found the birds fairly common, and shot six of the many heard and seen. Of these seven specimens, one, the bird taken June 24, 1884, is a large light-colored male which Dr. C. Hart Merriam, who kindly examined the series for me, states is nearer *arenacea* than *pusilla*. While the other six specimens are somewhat lighter in general coloration than are typical eastern *pusilla*, and in three or four instances show conspicuous gray feathers on the crown, still on the whole they are much nearer the eastern form. Dr. Merriam remarks upon the singular fact of the occurrence of these two forms in the same locality. The Field Sparrow is reported rom Lanesboro, Fillmore County, in the southeastern part of the State, in the springs of 1884 and 1885 ('Report on Bird Migration in the Mississippi Valley in the years 1884 and 1885', p. 202) and in a manuscript list of the birds of that locality, prepared by Dr. Hvoslef and temporarily in the hands of the writer through the courtesy of Dr. Merriam, it is noted as an "abundant summer resident." E. E. Thompson reports it as breeding in western Manitoba ('The Auk,' Vol. III, p. 324). There must be vast areas of intervening country where the species is sparingly distributed or does not occur at all.

Helminthophila pinus. BLUE-WINGED YELLOW WARBLER.—May 17, 1880, I shot a male bird at Minnehaha Falls near Minneapolis. The skin is now in my collection. This Warbler is undoubtedly rare here, and this is probably very near the limit of its northward migration. Dr. Hvoslef speaks of it as a rare migrant at Lanesboro, Fillmore Co., and records its occurrence in August. "Aug. 28, '87, shot 2."—Hvoslef.—THOS. L. ROBERTS, *Minneapolis, Minn.*

Note on Pacific Coast Birds.—I wish to call the attention of all ornithologists, to a circumstance that has never been sufficiently explained and may therefore cause misunderstanding in reference to my statement given in the 'Ornithology of California.' In 'The Auk' for Jan., 1890, I am quoted on p. 24 as saying that the eggs of *Pipilo fuscus mesoleucus* resemble those of *P. fuscus*. The facts are that I never saw the bird

mentioned alive, nor its eggs. I only collected in Arizona at Fort Mojave, about a mile from the California side of the River Colorado, and therefore considered the birds collected as without doubt belonging to the Californian avifauna. My MS. report was intended to relate only to birds belonging to California, as determined on good authority, though I included a few of the species found at Fort Mojave, which I had not actually obtained west of the river. But among them was *not* the *P. f. mesoleucus*, as I found none. In the preface to the 'Ornithology of California' it is stated that the plan was afterwards changed so as to include all land birds of the west slope of the United States, and Prof. Baird, who advised this, in editing the volume added all then known in the region, besides a few more, 'on a venture' or suspicion that they *might* at some future time be found there. His name was generally added, but not always, and thus I am quoted for what I did not write, and had no opportunity to prevent or correct (see Proc. Cal. Acad. Sc., VI., 189, 1875). As Prof. Baird had no eggs of the species mentioned he must have judged from those of *P. aberti*. Besides the 36 species which have "(Baird)" as authority at the end, all of which were then unknown as Californian, the following are included by him as editor, though for some unknown reason he did not add his name:

1. Harporhynchus cinereus, Lower California.
2. Campylorhynchus affinis, " "
3. Helminthophaga virginiæ.
4. Dendrœca chrysopareia.
5. Vireo atricapillus.
6. Vireo belli. Given by me in 1862 as found in California, for var. *pusillus*.
7. Vireo vicinior.
8. Pyranga hepatica.
9. Plectrophanes nivalis.
10. Passerculus guttatus, Lower California.
11. Ammodramus samuelis. Now known as a variety of *Melospiza fasciata*.
12. Peucæa cassini.
13. Calamospiza bicolor.
14. Cyanospiza versicolor Lower California.
15. Pyrrhuloxia sinuata " "
16. Cardinalis igneus " "
17. Pipilo mesoleucus.
18. Pipilo albigula. Lower California.
19. Cyanura macrolopha.
20. Contopus pertinax. Lower California.
21. Atthis heloisæ " "
22. Centurus aurifrons.
23. Melanerpes formicivorus angustifrons. Lower California.
24. Nyctea nivea.
25. Surnia ulula.

26. Falco femoralis.
27. Ectopistes migratoria. Not found by me on western slope, except in Montana.
28. Melopelia leucoptera.
29. Meleagris mexicana.
30. Callipepla squamata.

Total 66.

Those from Lower California he supposed must soon be found north of the boundary, but so far but few have been obtained, chi fly in Arizona. As to the rest I ought not to be quoted for their occurence either in California or anywhere on the Pacific slope, as my part of the work relates only to California birds.—J. G. Cooper, M. D., *Haywards, Cala.*

CORRESPONDENCE.

[*Correspondents are requested to write briefly and to the point. No attention will be paid to anonymous communications.*]

Recording the Numbers of Birds Observed.

To the Editors of the Auk:—

Dear Sirs:—In an interesting article in 'The Auk' a year ago Mr. Witmer Stone speaks of the difficulty of estimating the number of birds in a given locality, and declares it "wellnigh impossible." Although this difficulty is, perhaps, not so great as it seems, yet it has been so generally recognized that almost all field observers seem to have accepted the case as hopeless, and to have contented themselves with entering a bird in their note-books, as well as in published lists, as 'abundant,' 'rare,' or 'rather common,' words of such pleasing indefiniteness that they seldom mean the same thing to two different observers, or to the same person in regard to different species. The result is that we have but the vaguest idea of the relative abundance of different birds or of the fluctuations of any one species in different years or from day to day through its period of migration.

To take a complete census—except perhaps during the breeding season—may be out of the question, but there is no reason why an observer should not make his work exact as far as his opportunities and abilities permit,—*i. e.*, why he should not keep a record of the exact number of birds of each species met with each day. This of course would not represent the actual number present in any locality, for varying circumstances of length of time spent in the field, extent and nature of the country covered during the day, weather, etc., would considerably modify the results, but, by entering all these facts in the day's journal, and giving them due consideration in making subsequent comparisons of the figures obtained, results can be reached that, if not exact, are at least an approach toward it, and of vastly more value than the record of a vague

generalization based perhaps as much on some mere accident that has strongly impressed the imagination, as on any serious consideration of the facts observed.

This practice of keeping a careful count has been in use for the last few years among several ornithologists of my acquaintance, and it would seem worth while to urge its general adoption among field naturalists, if it were only to infuse a spirit of more scientific exactness into their field-work. Our way is to jot down in the field with pencil and paper—perhaps on the back of an old letter—every individual bird seen or heard. If birds are few, and one's memory good, it may be possible to do this all at the end of the day, but for most people, and in the height of the season, the best way is to stop every little while—in the inevitable pauses of waiting for some bird to show himself or to sing again—enter the species not already on the list, and mark against each name the number seen or heard since the last entry. Care must be taken to make due allowance for individuals already previously observed during the same day, in order not to unduly swell the record by entering them over again. At the end of each day the results can be transferred to the permanent record. To some the work may seem an irksome slavery, hopelessly interfering with their enjoyment of the beauties of nature. But with a very little practice they will be surprised to see how easy it becomes, and how much more thoroughly they observe when they have an increased incentive to identify every bird and count the number in each flock.

To illustrate the system, I give a brief extract from the notes taken near Cambridge last season by Mr. Jonathan Dwight, Jr., and myself.

May	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*
Ampelis cedrorum . .					2				3	4		11		10	7		2	4
Vireo olivaceus . . .		3		5	5	1	1		10	9		2		3	21	1	2	9
V. gilvus	10	9	2	12	8	2	1	2	15	14		4		8	10	1		6
V. flavifrons	1	2	1	4	1	1	1	1	2					1	1		2	4
V. noveboracensis . .				2	1				1								1	
Mniotilta varia . . .	4	10		6	6				5	2		1		1	3			
Helminth. chrysoptera	6			1											1		1	
H. ruficapilla	1				5				1	1				1				1
Compsoth. americana. .		3	1											1				
Dendroica æstiva . . .	12	15	2	35	28	1	3	1	39	13	1	5	1	12	37	2	5	26
D. cærulescens. . . .		4																
D. maculosa	1	1																
D. pensylvanica . . .	8	12		4	4				8	9		2		2	7			1
D. striata	2		1	1	2				4	1		2	2	4	5	1		
D. virens		7		1					1	3				1				2
D. vigorsii	1	1		1					1			2		1	1			1
D. discolor	1	8		10	5				5	3		2		1	4			1

As a matter of convenience we use for a permanent record pages on which the species likely to be met with are printed in systematic order down the left hand margin. These pages are ruled both horizontally and vertically, and the vertical columns headed with the days of the month, so that a space is given for the entry of each species under each day. This greatly facilitates the making of the original entry, and upon subsequent reference to it the history of the occurrence and abundance of any species during the period of observation may be read at a glance.

When it happens to be impossible to make an exact count—as is sometimes the case with a large flock of birds—the fact of the number recorded being only an estimate can be indicated by attaching to the figures any arbitrary sign to suit the fancy of the observer. Similarly, signs and abbreviations can be used to indicate that a species was in flocks, was apparently migrating, was singing, etc. As a rule, however, such facts can be more profitably treated at greater length in the note-book proper.

Hoping that others may be induced to follow this plan, and so with but little trouble greatly increase the scientific value of their field-work,

I am,

Respectfully yours,

C. F. Batchelder.

Cambridge, Mass.,
March 14, 1890.

NOTES AND NEWS.

Dr. Ladislas Tackzanowski, an Honorary Member of the American Ornithologists' Union, died at Warsaw, Russia, on January 17, 1890, at the age of seventy years. For many years he was director of the Zoölogical Museum of Warsaw. His numerous important publications on the ornithology of Siberia, Northern Africa, and South America, made him one of the leading ornithologists of the world. His principal special work, his 'Ornithologie du Pérou,' in three octavo volumes, was published in 1884-86, and forms a most useful handbook of the ornithology of the region treated.

Since the publication of the By-Laws of the American Ornithologists Union in 1887, the following Articles and Sections have been amended to read as follows:

Article I, Section 3. Associate Members shall be residents of North America, and shall not be limited in number.

Article II, Section 4. The Treasurer shall collect all dues from members, attend to all receipts and, after approval of bills by the President, make all disbursements, and shall have charge of the property of the Union, and make a report of the same to the Union at each Stated Meeting.

Article IV, Section 9. Every Honorary and Corresponding Member-elect shall notify the Secretary of his acceptance of membership within one year from the date of his election; in default of which notification, his name shall not be entered on the roll of members.

Article V, Section 2. The annual assessment for the ensuing year shall fall due on the first day of each Stated Meeting.

Article V, Section 3. No Active Member in arrears for dues shall be entitled to vote or take part in the business of any meeting.

Article V, Section 4. The name of any member one year in arrears for dues shall be removed from the roll of membership, provided that two notices of indebtedness shall have been given him by the Treasurer, at intervals of three months; and no such person shall be restored to membership until all arrearages have been paid, or the person has been re-elected.

MR. JONATHAN DWIGHT, JR., proposes to make a critical study of the entire group of Juncos, and solicits for this purpose the loan of material from those having specimens in their collections. It is especially desirable to secure large series of specimens of all of the different forms taken in the breeding season. As the material is not desired for use before next November, it is hoped, in the interest of science, that collectors will give special attention to this group during the coming season and be willing to promptly transmit their material to Mr. Dwight early in he autumn. The specimens should be sent to Mr. Dwight, care J. A. Allen, American Museum of Natural History, 77th St. and 8th Ave., New York, N. Y. They will be returned to the owners with reasonable promptness on the completion of the proprosed investigation.

IN ORDER TO make the 'Minor Ornithological Publications' as complete as possible, the Associate Editor earnestly begs the readers of 'The Auk' to send him copies of newspapers, or other publications of but local circulation, in which they may happen to notice any ornithological articles or items of scientific value. Such assistance will add greatly to the thoroughness, and hence the usefulness, of these records.

He also especially desires to obtain, for use in this same connection, Nos. 1, 3, 4, 9, 10, 11, of 'The Young Ornithologist' (published by Arthur A. Child at Boston in 1885-86), and Nos. 1 and 6 of Vol. I; also any numbers later than No. 1 of Vol. II, of 'The Florida Naturalist' published at St. Augustine in 1884-85 (the name changed in the second volume to 'The Naturalist'), and will be greatly obliged to any one who can inform him where copies of these issues can be purchased.

SOME READERS may be glad to know that record sheets such as are described by Mr. Batchelder in this number of 'The Auk' (antea p. 218), can be obtained at a small price from Mr. F. B. Webster, 409 Washington St., Boston. Each set is arranged for 200 species, and will hold a month's observations. They can be had printed with a selected list of 174 of the land birds that are most likely to come under observation in the region from Virginia to the St. Lawrence, east of the Mississippi, the rest of the space being left blank for insertion of any other species that may be noted. If preferred—as might be the case if used beyond these limits—they can be obtained with the spaces for the names of the species left blank, to be filled by the observer to suit the fauna of his own region.

A FOURTH EDITION of Dr. Coues's 'Key to North American Birds,' will be brought out immediately by Messrs. Estes and Lauriat of Boston. It will be printed from the same plates as the third, of 1887, and so will be identical in the main body of the text; but will contain an additional 'Second Appendix,' in which will be noted all changes which the A. O. U. Committee on Nomenclature have acted upon in the Committee's 'Supplements' of 1889 and 1890, thus bringing the subject down to date. A short second preface will appear with this edition.

THE 'ORNITHOLOGISCHES JAHRBUCH: Organ für das palæarktische Faunengebiet,' is a new ornithological journal, devoted especially, as its name implies, to Palæarctic ornithology, edited by Victor Ritter von Tschusi zu Schmidhoffen, President of the Committee for Ornithological Observation Stations in Austria-Hungary, and published at Hallein. It is a 24-page, large octavo monthly, the first number bearing date January, 1890. It is intended later to increase the number of pages and add illustrations. It is intended to fill the long-felt need of a special medium of publication for the now widely scattered material relating to the Palæarctic ornis. The first two numbers are devoted to records of rare captures in various parts of northern Europe.

THE OBSERVER, published monthly, by E. F. Bigelow, at No. 5 Waverly Avenue, Portland, Conn., is an eight-page newspaper, devoted to natural history and popular science, with a department of 'Ornithology' under the editorship of Mr. John H. Sage, containing original and selected articles. The first number is dated January, 1890. 'The Observer' is well edited and attractively printed, and as a popular journal of natural history well deserves many readers.

MR. W. E. D. SCOTT, with an ornithological assistant, has started on an exploring trip to the Dry Tortugas, Key West, and the whole chain of keys up to Key Biscayne. The trip will occupy several months. Some account of it may be expected in the July issue of 'The Auk.'

WILL the person who, in January last, sent a section of a spruce tree with excavation of the Pileated Woodpecker, to R. Ridgway, Smithsonian Institution, please send him his address?